WATER RESOURCE PROGRAMS OF THE UNITED STATES, RUSSIA, AND (RED) CHINA

JOINT HEARINGS

BEFORE THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

AND THE

COMMITTEE ON PUBLIC WORKS

UNITED STATES SENATE

EIGHTY-FIFTH CONGRESS

SECOND SESSION

ON

S. Res. 248

RELATIONSHIP OF WATER RESOURCE DEVELOPMENT PROGRAMS OF THE UNITED STATES, RUSSIA, AND (RED) CHINA

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WATER RESOURCE DEVELOPMENT

MONDAY, FEBRUARY 17, 1958

UNITED STATES SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
AND COMMITTEE ON PUBLIC WORKS,
Washington, D. C.

The joint session convened, pursuant to call, at 10 a. m., in room 224, Senate Office Building, Senator Joseph C. O'Mahoney presiding.

Present: Senators Joseph C. O'Mahoney (Wyoming), John A. Carroll (Colorado), Arthur V. Watkins (Utah), Henry Dworshak (Idaho), and Frank A. Barrett (Wyoming).

Also present: Richard L. Callaghan, chief clerk; Michael W. Straus, consultant; Goodrich W. Lineweaver, staff assistant for reclamation, Committee on Interior and Insular Affairs.

Senator O'MAHONEY. The committee will be in order, please. In view of the fact that the Senate will be in session today, and some legislation probably calling for a vote will be up for consideration, I think I shall start this hearing without waiting for other witnesses and observers who may have found it more difficult than the Senator from Louisiana and the Senator from Wyoming on account of the snow this morning, to say nothing of former Reclamation Commissioner Mike Straus, and Mr. Clyde Ellis.

The hearing is being held to consider Senate Resolution 248, introduced in the Senate on January 23, 1958, by Senator Murray, Senator Chavez, Senator Kerr, Senator Anderson, and myself.

This is a resolution expressing the sense of the Senate that the Committee on Interior and Insular Affairs, and the Committee on Public Works, should hold joint hearings in connection with the relationships of river and related water resource development programs. This resolution will be made a part of the record at this point.

(The document referred to follows:)

[S. Res. 248, 85th Cong., 2d sess.]

RESOLUTION

Whereas in committee print dated December 20, 1957, the chairman of the Committee on Interior and Insular Affairs transmitted a summary of available information on the "Relationships of River and Related Water Resource Development Programs of United States, Soviet Russia, and (Red) China", which was subsequently officially laid before the President of the United States;

Whereas said information indicates comparative conditions and progress or lack of progress in river control, irrigation, hydroelectric power development and associated water resource conservation and use that require a complete revelation of facts and circumstances that should be brought to the attention of the Senate of the United States; and

Whereas a full disclosure of comparative conditions and programs in water resource development programs in the United States and other countries men-

tioned is vital to the future economic stability and survival of this Nation: Now, therefore, be it

Resolved, That it is the sense of the Senate that the Committee on Interior and Insular Affairs and the Committee on Public Works holds joint hearings on the fact and circumstances in connection with the "Relationships of River and Related Water Resource Development Programs" and other pertinent matters and report their findings to the Senate during the current session.

Senator O'MAHONEY. I also want to place in the record a copy of the original letter of January 31, 1958, addressed to the chairman by Senator Murray, chairman of the Committee on Interior and Insular Affairs, and Senator Chavez, chairman of the Committee on Public Works, asking me to preside at these hearings, and to conduct them.

(The letter referred to follows:)

UNITED STATES SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
January 31, 1958.

Hon. JOSEPH C. O'MAHONEY,
United States Senate, Washington, D. C.

MY DEAR SENATOR O'MAHONEY: We have before us Senate Resolution 248 under which the Senate on January 23 instructs "that the Committee on Interior and Insular Affairs and the Committee on Public Works hold joint hearings on the facts and circumstances * * *" as to the relationships of certain water developments. As a sponsor of this resolution, along with ourselves and others, we know you are quite familiar with this matter on which there has been previous correspondence and which our committees desire to pursue.

It is our belief that we might promptly discharge our responsibility under the resolution by holding the joint hearings in February under your experienced guidance. This is, therefore, a request that you accept the chairmanship of these joint committee hearings, arrange for and convene them as you deem best, and also see that the report of their findings to the Senate during the current session, as called for in the resolution, is available. We earnestly hope we may have early confirmation of your acceptance of this responsibility.

Consider the facilities of the committees at your disposal in discharging this task. Let us also report that Senator Kerr, along with ourselves a sponsor of the resolution, has expressed continuing interest and is, therefore, designated as a specific representative of the Public Works Committee to serve in these hearings. Chairman Hayden, prior to the passage of the resolution, reported that the interest of the Appropriations Commitee would be represented by Senator Ellender.

Senator Anderson, also a sponsor of the resolution, reports continuing interest, and regrets his activities on the Joint Committee on Atomic Energy preclude his presiding, but not his attendance, at hearings under Senate Resolution 248. Senator Jackson has also expressed his desire to assist in developing this matter. We feel all members of both committees will assist in this joint task under your skilled chairmanship.

Sincerely,

JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs.
DENNIS CHAVEZ,
Chairman, Committee on Public Works.

Senator O'MAHONEY. I also want to place in the record a copy of the letter of February 17, 1958, from Senator Murray asking that Senator Carlson be given a few minutes to present a statement on his bill, S. 1019.

(The letter referred to follows:)

UNITED STATES SENATE,
COMMITTEE OF INTERIOR AND INSULAR AFFAIRS,
February 17, 1958.

Hon. JOSEPH C. O'MAHONEY,
United States Senate,
Washington, D. C.

DEAR SENATOR: I hope you will give Senator Carlson a few minutes at your hearing on Senate Resolution 248 to present a statement on his bill, S. 1019, regarding a commission on natural resources. The Department of the Interior and Bureau of the Budget have made unfavorable reports on this bill but I feel Senator Carlson is entitled to make a presentation which he tells me will be brief.

Your cooperation will be appreciated.

Sincerely,

JAMES E. MURRAY, *Chairman.*

Senator O'MAHONEY. We have as participants the following named persons who have already indicated to the chairman their desire to cooperate: As members of the committees holding the hearing, Senator Kerr will represent the Public Works Committee. Senator Jackson, of the Interior Committee, has advised me that it is his desire to be present. Mr. Strauss will open the hearing with a brief statement of the problem before us. Senator Ellender, who has had the unusual experience of three trips behind the Iron Curtain, during which he was permitted to take motion pictures as well as still photographs, will relate to us his eyewitness observations and personal experiences. Mr. Clyde Ellis, general manager of the National Association of Rural Electric Cooperatives, is attending the meeting also.

Maj. Gen. Emerson C. Itschner has advised the chairman that he will be present. He is scheduled for tomorrow. Mr. Angus MacDonald of the Farmers Union, and Gus Norwood, president of the American Public Power Association, have been invited and have indicated their desire to be present.

Ambassador William S. B. Lacy, Special Assistant to the Secretary of State for the East-West exchange program—termed cultural exchange with Soviet Russia—has also been invited to be present.

On Friday I had a conference with Mr. Merrill and Mr. Lowry, representing Ambassador Lacy, and I invited them to be here as observers this morning.

Mr. Merrill is the director of the East-West exchange. The observers from other branches of the Government, will you please rise and give your name, so that we may have it in the record?

Mr. PHILLIPS. George R. Phillips, Department of Agriculture.

Senator O'MAHONEY. Thank you, Mr. Phillips.

Mr. BENNETT. John B. Bennett, representing the Department of the Interior, Director of the Technical Review Staff.

Senator O'MAHONEY. Thank you.

Mr. WOODWARD. Douglas Woodward, member of the Technical Review Staff, Department of the Interior.

Senator O'MAHONEY. Thank you very much.

Is there anyone else from the departments? Mr. Straus, you were formerly Commissioner of Reclamation, and at the direction of the chairman of the Committee on Interior and Insular Affairs you have prepared a monograph on this problem.

Do you care to make a brief opening statement with respect to the contents of this memorandum? This memorandum will be made part of the appendix of this record.

STATEMENT OF MICHAEL W. STRAUS, CONSULTANT

Mr. STRAUS. May I report also, Mr. Chairman, that Senator Robert Kerr telephoned that he was snowbound in Oklahoma City, but wants very much to be here. He will be here tomorrow morning, and desires particularly to be present when the Chief of Engineers, General Itschner, appears tomorrow morning.

Very briefly, Mr. Chairman, just to get this before the committee, you have the resolution, and that is what we are having this hearing about. Preceding this resolution, there was a staff study initiated by Chairman Murray. All of the members of the committee have been provided with copies. At this time I merely want to report an additional wealth of material, advice, and information that has accumulated subsequently, all pertinent and some of the most recent origin, which is herewith placed before the committee for its convenience and desires. It is a box full of data.

Senator O'MAHONEY. You are referring to this committee print?

Mr. STRAUS. The committee print and additional material that has come in, most of this subsequent to the preparation of the committee print.

Senator O'MAHONEY. It will be made part of the record, but not of the printed record as yet.

Mr. STRAUS. Yes, sir. I will cite only two of these documents now that have been put in committee print form for your convenience. One is most specific eye witness reports provided by Senator Ellender, and the other has been provided by Senator Henry Jackson. As both are to be participants, these committee prints will be laid before you at the time of their appearance, which will be almost immediately.

A drawer full of additional current, graphic, statistical, textual, photographic, and all extremely current material on the subject of your hearings is also available. Included is new data from overseas as well as official transmissions from the executive department, generally solicited or received too late for earlier citation, and also generally confirmatory of the earlier committee staff prints.

Now, Mr. Chairman, to save time and serve the committee's convenience, with your permission I will provide and insert a summary index and skeleton description of this mass of material available to the committee that is before you, and I will put it into the record at this time.

It will identify all the material here.

(The document referred to follows:)

INDEX AND SUMMARY OF MATERIAL AVAILABLE TO THE COMMITTEE

a. British Electrical Supply Delegation Eyewitness (1956) Report on Russian Power Development.
b. Indian Government Report on Russian River Development.
c. Indian Government Report on Chinese River Development.
d. Summary Report of Konwar Sain, Chairman, Indian Central Water and Power Commission, on Visit to River Valley Projects in China.
e. Special Report, United States State Department, on Chinese River Development, December 1957.

f. Photostat of unsigned Moscow document (obtained via CIA) on Development of Hydroelectric Energy in U. S. S. R.
g. Photostat of Moscow Report by R. A. Alimov on Utilization of Waterpower Resources of Usbeck, S. S. R.
h. Photostat of Soviet Working Paper on Department of Electric Power in the U. S. S. R.
i. Photostat Report to Moscow of Chinese Director of Hydroelectric Construction entitled "Water Resources and Hydroelectric Construction in China."
j. Outline of Russian river development and economic plans as presented by First Secretary Khrushchev to U. S. S. R. Supreme Soviet on 40th anniversary of Russian Revolution.
k. Actual photographs on construction of Kubischev Dam by Soviets on Volga River.
l. Text from Moscow of Report on Electrification of U. S. S. R.
m. Photostat and translated text of Moscow article of Department of Hydroelectricity in the U. S. S. R.
n. Text of detailed Report on Chinese Water Power Resources Development, by Li Jui, Assistant Minister for Electric Power of People's Republic.
o. General (propaganda) booklet on Soviet Electric Power Developments and Prospects, by A. Markin, Moscow, 1956 (in English).
p. Photostat of British Report on Developments in Science in the Soviet Union. (This British eye-witness report, published in 1952, is chiefly of interest as it outlines the grandiose Soviet program when it was just getting under way.)
q. Assorted Federal Power Commission Reports on World Power Data and Relative National Business.
r. State Department Summaries and Reports on Soviet Water Resource Department, December 1957.
s. Department of Commerce (Bureau of Foreign Commerce) latest reports on basic economy of the U. S. S. R., including Statistics on Power Production and Water Transport and Other Speedups in the U. S. S. R.
t. The United Nations Economic Reports on U. S. S. R. in form of annual bulletin Electric Energy Statistics for Europe, Geneva Society, October 1956.
u. Assorted United States and Soviet press reports and photostats on Resources and River Development in Soviet States.
v. Department of Agriculture (Foreign Agricultural Service) Report of Russian Agricultural Development; also detailed U. S. S. R. breakdown of Irrigated Land Acceleration of Irrigation Program.
w. United States Department of Defense, Army Engineer Corps Reports on Inland Waterway Transport in the U. S. S. R., including recent speech by Maj. Gen. E. C. Itschner, Chief of Army Engineers.
x. Further Bibliography on Russian and Chinese River Development Reports, inclusive, provided by Central Intelligence Agency and not included in this file.
y. Actual photographs of Soviet Russia and China and other river development construction of recent dates.
aa. Current electrical power and increases in Asia and the Far East (other than Russia and China). The United Nations Economic Commission for Asia and the Far East Report.
bb. Statement of Mr. William S. B. Lacy before the National Press Club, Washington, D. C., Wednesday, February 12, 1958.
cc. Siberia's Hydropower Projects—Soviet Government, current 1957. Description in English.
dd. Single Power Grid for the U. S. S. R.—a Soviet Government 1957 description in English.
ee. U. S. S. R. in 1960—a Soviet Government English language description of the Soviet current economic plan, with special chapters entitled "Russia, Land of Electricity."
ff. Soviet Electric Power—A general popular "propaganda" description of the Russian hydroelectric power development.
gg. Availability of Water in the United States—industrial needs by 1980—a survey of United States requirements presented before the Industrial College of the Armed Forces, Washington, April 1957.
hh. Army Engineer Corps map of river development.
ii. Conference paper—Electrical Engineering Education and Research in the U. S. S. R.—AIEE Education Committee for the AIEE Winter General Meeting, New York, N. Y., February 2–7, 1958.

Mr. STRAUS. By direction of the chairman, the principal agencies of the executive department concerned with this subject matter were advised of this study on January 27, in writings to the Secretaries of State, Army, Interior, Commerce, and Agriculture, and the Chairman of the Federal Power Commission. They were provided with the resolution and the staff study, and invited to comment thereon to the committee, and also through spokesmen or otherwise to participate in the hearings.

Several replies were received and are held. Subsequently, on February 12, the same departments were advised of the date of the hearing, and again were invited to participate. Among the responses were, for example, that of the Secretary of the Army, who designated the Chief of Engineers to represent him, and who, therefore, is scheduled to be a witness tomorrow.

Other departmental representatives are present here. I saw Mr. Adams, of the Federal Power Commission come in.

Senator O'MAHONEY. Yes; these gentlemen came in just after you started. Will you rise and identify yourselves for the record, please?

Mr. ADAMS. I am Francis L. Adams, Chief of the Bureau of Power, Federal Power Commission.

Mr. HUGHES. I am Edgar T. Hughes, Federal Power Commission, Chief of the Division of Electric Research Requirements.

Mr. WEAVER. My name is Frank L. Weaver; I am Chief of the Division of River Basins of the Bureau of Power, Federal Power Commission.

Senator O'MAHONEY. Thank you very much, gentlemen.

Mr. STRAUS. Mr. Chairman, if there are no inquiries, that is all I have. Before Senator Ellender reports, we will distribute, with the Senator's permission, his earlier report at this time, which I think he may go beyond in his testimony.

STATEMENT OF HON. ALLEN J. ELLENDER, UNITED STATES SENATOR FROM THE STATE OF LOUISIANA

Senator ELLENDER. Mr. Chairman, I am very glad to be present today.

Senator O'MAHONEY. May I say before you begin, Senator, that I heard part of your presentation on the floor of the Senate. I have the printed copy of your diary as you were traveling through Europe, and I had the good fortune to see your presentation on television a week ago yesterday on channel 5, as I recall it, with the motion pictures that you, yourself took at various spots throughout Soviet Russia and Siberia. I was particularly impressed with the fact that you showed photographs, and motion pictures, revealing the scenes around some of the powerplants which have been constructed behind the Iron Curtain.

I was particularly impressed with the fact that some of these pictures were taken by somebody other than the Senator, because the Senator appeared in the pictures as proof that you were where you say you were.

Now you may proceed.

Senator ELLENDER. I would like to say before we begin that it is very seldom that I appear before a Senate or a House committee. As a rule, I leave others to do the testifying, but in this case I am making

an exception because I have been told that I am one of the few Americans who has ever visited parts of Siberia where several huge hydroelectric powerplants are now being built.

The first year of my visit in Russia I did not interest myself very much in visiting the powerplants, because I was very much interested in studying the Embassy and their facilities in Moscow. I learned while there that most of the power obtained for Moscow was steam generated, with very little coming from the large dam at Dnepropetrovsk, on the Dnepr River.

In 1956, because of the fact that I am very much interested in power development in our own country, on every occasion I had, I visited powerplants in European Russia particularly.

Mr. Chairman, I ask permission to read for the record at this point a statement prepared by me which covers principally my visit in Russia of last year, 1957, and also some comments on new starts, on civil works, in our own country.

Mr. Chairman, I appreciate the opportunity afforded me to appear before the committee today to discuss the relationship of river and related water resource development programs of the United States and Soviet Russia. At the suggestion of the chairman of this committee, the Honorable James E. Murray, I prepared an addendum to the report of Mr. Michael W. Straus, consultant to the committee on the relationship of river and water resource development programs of the United States, Soviet Russia, and (Red) China. That addendum, I understand, has been printed as Committee Print No. 2 of that report.

Mr. Chairman, sometimes I feel that water resource development is similar to the weather. It seems every one is talking about it but no one does anything about it, at least there are too few that are prepared to support an adequate program of water resource development. I ran across a very startling statement in the report of the Task Force on Water Resources and Power of the Second Hoover Commission, dated June 1955, that I believe is worth bringing to the attention of the committee at this time. That statement is as follows:

> The United States uses more water than it does all other materials combined, averaging some 1,200 gallons for each person each day. In 1950, this amounted to about 1,800 tons of water for each person as compared to the 18 tons used of all other materials, including food.

In the report of the Presidential Advisory Committee on Water Resources Policy, dated December 22, 1955, it was stated that the estimated use of water in the United States in 1950 was 185 billion gallons per day and that, based on an estimated population of 200 million, by 1975 the requirement would be 350 billion gallons per day. The current prediction is that our population will be 230 million by 1975. On the same basis, that would present a requirement for 400 billion gallons per day. In other words, in less than 25 years we would more than double our use of water. That, Mr. Chairman, is now only 17 years away and when you consider the period of time required for surveys, detailed planning, and construction, it will soon be too late to initiate a program that will provide the facilities required to meet this demand by 1975.

I believe water supply is a local responsibility; however, the number of good reservoir sites are limited. It would be a serious mistake if

we allowed a good site to be preempted by partial development to meet a local need for water supply. The omnibus river and harbor bill, S. 497, as passed by the Senate last year, contains a provision which will permit the inclusion of storage for domestic water supply. The communities requiring this storage would then reimburse the Federal Government for this service when used. In this manner many communities can be served from the same reservoir.

I refer to our own requirements at this time because I desire to commend the chairman of the Committee on Interior and Insular Affairs for his foresight in requesting his staff to assemble the readily available information on resource development in Russia and Red China in a convenient and usable form for a comparison of the relationships of their activities in this field with our own. The study which your staff has prepared points up the tremendous importance which the Soviet Union has placed on water resource development. It cannot fail to demonstrate the fact that the Soviet officials have recognized the major role which water plays in the economic strength of the Nation.

In order that I might have first-hand information on development and conditions in Russia, I have visited that country during each of the past 3 years. Last year I traveled extensively within the Soviet Union for 33 days. I had the opportunity of visiting cities never before seeen by an American Government official and talked with and came in contact with literally thousands of Russian people. During this period I had the opportunity of inspecting hydroelectric power projects in Siberia. There, again, I was the first Government official to have an opportunity of making a personal inspection of these truly remarkable projects. I visited several hydroelectric power stations more than 1½ times as large as anything we have in this country. I have seen foundations poured for turbine generators having a rated capacity of 300,000 kilowatts each—much larger than anything we have. And these projects, Mr. Chairman, were designed, constructed, and all component parts built within the Soviet Union.

I believe that the study made by your staff is very timely since there is an increasing awareness among our people that the traditional concept of the Soviet Union as a backward, semideveloped nation is incorrect. This awareness has become more acute with the launching of Sputniks I and II as far as the average American is concerned. For those of us who have had access to even the fragmentary information reaching us from behind the Iron Curtain, these developments come as no particular surprise.

In studying the relationship of resource development in Soviet Russia and the United States, there is, of course, absolutely nothing that we can do about such developments in Russia. They are doing it with their own resources to meet the needs of their own expanding economy. Any action that is taken to keep these relationships in balance must be directed toward a program of resource development that is adequate for our own needs.

As a result of my inspection of installations in Russia, I am convinced that in water, transportation, and hydroelectric power development they are inching ahead of us, and in some areas of the tooling industry they are very close to our own standards.

VOLGA-KAMA SYSTEM

On the Volga and the Kama Rivers there will be constructed 14 hydroelectric stations with a total capacity of 11.5 million kilowatts. Six of these hydroelectric stations with a total capacity of 3,474,000 kilowatts have been put into operation, including:

Station	Units	Capacity	Year
		Kilowatts	
Ivankov		30,000	In 1937.
Uglich		110,000	In 1940; completed, 1941.
Shcherbakov		330,000	In 1941.
Gorki	8, at 59,000 kilowatts	400,000	In 1948–56.
Kama		504,000	In 1956.
Kuibyshev	20	2,100,000	In 1955–57.

Other units of this plan that are under construction include:

	Capacity (kilowatts)
Stalingrad (21 unit)	2,310,000
Saratov	1,000,000
Vodkin	970,000

In addition, preliminary work is being done on the construction of Tower Volga, Cheboksarask, and Tower Kama.

The immensity of these installations can only be appreciated when you consider that the largest hydropower station in the United States, the Grand Coulee Dam, has an installed capacity of 1,924,000 kilowatts.

GORKI HYDROPOWER PLANT

This plant, located about 50 miles north of the city, is one of 8 large stations either in operation or planned for operation along the Volga.

Mr. Ivanov, the director and chief engineer of the project, showed us around. Construction started in 1948 and the first generator was put into operation in November 1955. At present all eight units are in operation. The capacity of each generator is 59,000 kilowatts. The lake in back of the dam contains 10 billion cubic meters of water and measures 440 kilometers, about 275 miles in length, by a width of 16 kilometers, or 10 miles.

During the year 3 billion cubic meters of water are used for power production. The turbines were constructed in Leningrad and are of the Kaplan design. Each turbine uses about 500 cubic meters of water per second. The average power produced will be 1.5 billion killowatts per year with a maximum capacity of 2.2 billion killowatts.

We discussed with the chief engineer the plan to divert two rivers into the Volga that now flow into the Arctic. This scheme is only in the planning stage and the water from these rivers would only be used in flood stage. Such a plan would add a large quantity of water to the Volga at certain periods, depending on snowfall in the head area waters of these streams. The execution of such a plan would mean a substantial increase in the electric generating capacity of the Volga River during a period of high water in the Arctic rivers.

KUIBYSHEV HYDRO PROJECT

Kuibyshev, founded in 1956, is located at the confluence of the Samara River with the Volga. It was originally called Samara.

At the Kuibyshev hydroelectric station we talked to the engineer in charge of operations who has directed the construction of this project for the full 7 years since its beginning. This is the second largest hydro plant on the Volga. Only the Stalingrad station which is under construction will be like it. The hydro station is built on the right bank of the Volga where the underlying material is clay and sand. The project engineer informed me that the foundation conditions at this site required the solution of many difficult engineering problems.

The dam, which was started in 1951, will have a total capacity when completed of 2.1 million kilowatts. Daily production will be 30 million kilowatt-hours. There will be 20 turbines in operation, each having a capacity of 105 kilowatts; 17 turbines are now in operation and the remaining 3 were to be completed before November 7, 1957, I was told. All the turbines were built in Leningrad and all the equipment used in the dam was built in Russia. The cost of producing power is estimated at 1.2 kopeks (at the official rate of exchange that would be 3 mills) per kilowatt. Power from this station is now serving Moscow and the central area 1,000 kilometers away. I was informed that 196 million cubic meters of earth were removed during the construction and approximately 60 percent of the space created by the excavation has since been replaced by cement, other building materials, and hydroelectric equipment. A total of 7,525,000 cubic meters of concrete had been poured up to the time of my visit. The cement was manufactured in a plant that was built at the site; 59 million cubic meters of water are impounded behind the dam and the lock dimensions are 300 by 30 meters. The lift is 15 meters from the upper to the lower level.

We visited the locks then in operation and saw vessels as well as logs passing through. We were informed that 7 million cubic meters of timber had passed through the locks in special compartments during the first 9 months of operation this year.

STALINGRAD PLANT

En route from Kuibyshev to Krasnador we stopped at Stalingrad for gas. Before landing I could see the great dam being built across the Volga which I visited last year. I was informed that considerable progress had been made since that time. The capacity of this plant when completed will be 2,350,000 kilowatts, slightly larger than the Kuibyshev project now approaching completion.

SIBERIA

Almost uniformly I found improvements in Russian conditions as contrasted with my impression last year (1956) and the year before (1955). A a matter of fact, some of my previous estimates, particularly with respect to Russia's agricultural potential, had to be modified in the light of my trip through Siberia. This enormous area, which most of us consider the world's icebox—a huge prison camp—a vast waste of barren land—is actually becoming Russia's breadbasket.

While the climate is somewhat more severe than that of our own upper Middle West, the area has proven itself capable of producing some fruits, considerable livestock and dairy products, and a large variety of root crops and grains. Yields of grains are high, although method of planting, cultivating, and harvesting are obsolete by our own standards.

When I visited the Novosibirsk branch of the Academy of Science, which was founded in 1944 and has increased its staff from 28 to 700 in 1957, I was informed that although Siberia and the Krasnoyarsk areas represent 2 percent of the earth's surface, they have 10 percent of the world's electric power potential.

SIBERIAN HYDRO STATIONS

On the swift Angara and Yenisei Rivers a series of hydro projects are under construction and proposed, which include the following:

Station	Units	Capacity	Year
		Kilowatts	
Irkutsk	8, at 82,100 kilowatts	660,000	1951–59.
Krasnoyarsk		3,600,000	Planning will be completed within 10 years.
Bratskaya	12 to 15, at 200,000 to 300,000 kilowatts.	3,200,000	Under construction, with the 1st units on the line by 1960.
OB RIVER			
Novosibirsk	7, at 58,000 kilowatts	400,000	1951–59.

The hydro project at Irkutsk on the Angara River follows the same pattern as that at Stalingrad in that a housing project was built for the workers with schools, a hospital, a cultural center, kindergarten, stadium, etc. This project was started in 1951 and now has 2 of its 8 proposed generators in operation. Four more will be completed in 1958 and the final two will be placed in operation in 1959. The total capacity of the plant when finished will be 660,000 kilowatts.

I saw two turbines that have been completed and are in operation as well as one of the new units being tested. Each turbine has a capacity of 82,100 kilowatts and they are being constructed in Kharkov. The generators, which are 13 meters (about 47 feet), are being manufactured in Novosibirsk.

I was informed that locks will be provided later for navigation since building the dam will make the Angara River, which is the only outlet for Lake Baikal, navigable all the way to the lake. Further north the Angara River joins with the Yenisei, and I was informed that there is being planned another large hydroelectric plant which is south of the city of Krasnoyarsk, with a capacity of 3.6 million kilowatts. This project is scheduled for completion within the next 10 years.

I was informed that there is now under construction a hydroelectric plant on the Angara River north of Irkutsk with a capacity of 3.2 million kilowatts named the Bratskaya hydroelectric plant, and that there will be 16 turbines with a capacity of 200,000 kilowatts each. I saw movies of the ground-breaking ceremonies as well as of the erection of a city with schools, theater, etc. There was also shown the pouring of the first batch of concrete in the construction of the dam. The first power from this project is scheduled for 1960, according to our guide.

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NOVOSIBIRSK HYDRO PROJECT

We visited the Novosibirsk hydro project on the Ob River, which flows into the Arctic. The river Ob is wide at places and islands are numerous. Sand bars appear quite frequently and the channel is maintained by means of dredges with buckets installed on endless chains.

The project was started in 1951–52 and will be completed in 1959. By the end of the year 3 generators will be in operation, I am told, while 1 turbine is now almost ready to produce electric current. Each generator will use 500 cubic meters of water per second and is 13 meters in diameter, which is the same size as those at the Irkutsk station. The overall length of the dam is 5 kilometers. It will produce 400,000 kilowatts from 7 generators, each having a capacity of 58,000 kilowatts.

While we were there every effort was being made to get the first of the seven generators into operation by November 7, 1957. By the end of 1957 three generators were scheduled to be in operation.

I was informed that two more hydroelectric power dams are being planned on the Ob River.

As I previously stated, there is nothing that we can do about resource development in Russia. However, we can provide funds for the execution of an adequate resource development program in this country. In the 3 years that I have been chairman of the Appropriations Subcommittee on Public Works, the committee has added 122 new starts in the Army civil functions program in which the House conferees concurred in the views of the Senate. These were all urgently needed river and harbor, flood control, and multiple-purpose projects which will strengthen the economy of this country.

Last year I noted in the hearings and in cross-examining the witnesses from the Corps of Engineers that the completion dates on the majority of the projects were set back at least 1 year. It was evident from their testimony that in most cases this was the result of the ceiling given the corps as the maximum amount they could request for fiscal year 1958. It then became the task of the Chief of Engineers to allocate this money to the various projects and the inevitable result was the delays I noted.

It is my judgment that, with a nationwide program of river and harbor and flood-control projects of the present magnitude, the district and division engineers will require about a billion dollars for 1959 if all of these projects were to be kept on schedule. Considering the fact that in any program of this size there are unavoidable delays caused by bad weather, strikes, inability to obtain certain materials on schedule, I believe that an appropriation of $850 million in 1959 would be necessary in order to prevent unavoidable delays. I note that the budget submitted by the President for 1959 was only $627,670,000, and in my preliminary review of the justification sheets it is again evident that completion dates on most of the projects will be extended an additional year or two. I realize that, as a result of pressures by the administration to hold down expenditures, together with the restriction on incurring new obligations, it will be almost impossible to keep on even the schedules submitted last year. It appears, however, that if we started now to efficiently use available funds, an appropriation for this program of about $800 million in 1959 would

be a reasonable approach to providing an adequate resource development program in the next fiscal year.

You will recall that on June 28, 1957, the Director of the Bureau of the Budget, at the President's direction, dispatched a letter to the heads of all departments and agencies in regard to the action to be taken by them in apportioning funds available for expenditure in fiscal year 1958. The opening sentence of that letter read as follows:

> The President has requested that all agencies in the executive branch keep the rates of commitments, obligations, and expenditures for fiscal year 1958 at or below the level for the fiscal year 1957 to the extent feasible, and that I inform you of the necessary procedures for achieving this purpose. This task can best be accomplished by positive action on the part of each agency head. The apportionment and allotment system offers an existing administrative channel for each agency head to accomplish these purposes.

As a result of discussions with the Bureau of the Budget concerning actions to be taken under the directive of June 28, 1957, an expenditure ceiling was imposed, or at least an understanding that the corps' expenditures for fiscal year 1958 would not exceed $630 million.

After the first 6 months of operation under this directive or understanding, I became aware of the fact that several projects were about to be shut down and no additional funds could be transferred to those projects without exceeding an overall expenditure of $630 million during the current fiscal year. Some of these projects, such as Sutton Reservoir, W. Va., Ice Harbor lock and dam, Washington, and Hills Creek Dam, Oreg., were in critical unemployment areas.

On January 14, 1958, I wrote the Director of the Bureau of the Budget and informed him that I had received reports that certain projects would be shut down for lack of funds and I pointed out to him that sufficient funds were appropriated for fiscal year 1958 to permit the continuation of the public works program in an orderly manner during the current fiscal year. I then inquired whether in fact an expenditure ceiling had been placed on the Corps of Engineers, and, if so, requested certain specific information with respect thereto.

On January 29, 1958, I received a reply from Mr. Brundage. While he did not specifically state that a ceiling was or was not imposed, he did say that, following informal discussions with the Corps of Engineers, a decision was made to establish a reserve of $40 million, which it was estimated would increase expenditures for fiscal year 1958 to about $630 million. He then pointed out that, very favorable weather conditions during the first 6 months permitted construction to proceed at a rate above that contemplated at the time the apportionment was made and that, in view of these circumstances, he had asked that a reexamination be made of the financial program of the Corps of Engineers for the remainder of the year. He stated that this study had just been completed and that the Corps of Engineers had been informed that it should request a revised apportionment to provide for such amounts as are required to assure the continuation of a minimum economic rate of construction on going work and the initiation of new construction.

In this connection, it is still my understanding that new contracts are not to be awarded until late in the fiscal year so as not to incur any expenditures in fiscal year 1958.

On February 12 the President issued a statement on the present economic situation. In citing the steps the administration was taking to combat the recession, he stated:

> For some time now the administration has been engaged in systematic and comprehensive planning for expansion and modernization of public works and buildings, all of these useful public projects to be taken off the shelf when they could most appropriately be undertaken. Yesterday I directed the Postmaster General to present to the Congress a $2 billion program for modernization during the next 3 to 5 years of post-office buildings and equipment throughout the country.

Well, I suppose that is a step in the right direction, but I am sure that there are many places where Federal funds could be more advantageously used. But the most important thing is that there are other programs in which the stimulus to the economy from Federal expenditures would be both quicker and more direct. In the resource development field there are contracts on going projects that were originally scheduled for award in January and February that could be advertised now and awarded in 30 days instead of waiting until May or June. Plans could be laid now for increasing the tempo on other going work which should never have been delayed. To cite a few examples, I have consistently opposed legislation for the St. Lawrence seaway. The Congress, however, felt otherwise and the project is under construction and will be ready for operation in 1959. In order to utilize fully this seaway, the connecting channels of the Great Lakes must be deepened to accommodate the large vessels using the seaway. Completion of the project for the connecting channels of the Great Lakes has now been set back until 1965, 6 years after the St. Lawrence seaway project will have been in use. In all fairness, the connecting channels project should be kept on at least the schedule presented last year, which provided for completion in 1962. Certainly the delay in completion of the connecting channels will adversely affect the collection of tolls on the St. Lawrence seaway.

In the Pacific Northwest the Congress appropriated a million dollars to initiate construction on the John Day Dam, having an estimated cost of $350 million. The budget proposes an appropriation of $1 million to continue that project in fiscal year 1959.

In my own area there is the Mississippi River-gulf outlet, and the Baton Rouge Harbor projects that should proceed at a faster rate than presently contemplated in the budget.

Similar situations exist with respect to most projects. In the Ohio River Basin the replacement of locks and dams so urgently needed are delayed 1 or more years. The traffic in this area is so heavy that tows are frequently delayed 6 hours or more awaiting an opportunity to go through a lock.

The President included in his statement a fact paper on certain programs and proposals bearing on the current economic situation. That fact paper points out that civil public works will increase sharply in the current fiscal year and will be still higher in the coming fiscal year. As previously pointed out, there is no substantial increase in the budget recommendation for fiscal year 1959 over 1958. The increases, therefore, are the result of curtailing expenditures during the current year, and scheduling those funds for expenditure along with the new funds requested for 1959. In this connection, it should be noted that the figures cited for the natural resources program (mainly

water resources) are from the budget presented to Congress a month ago and in no way reflect any adjustment in the rate of expenditure in the light of the present unemployment situation.

Mr. Chairman, I appreciate the opportunity afforded me to present these remarks to the committee.

Mr. Chairman, with your permission I would like to highlight the statement which I have presented and add to it certain remarks concerning the trips that I took to Russia previous to 1957, particularly with reference to the developments on the Dnepr River and the large dam now under construction at Stalingrad.

My first visit last year was the dam at the Dnepr River, near Zaporozhye.

Senator O'MAHONEY. Is that the dam which was in the first instance built under the superintendence of the General Electric Co., of the United States?

Senator ELLENDER. By Americans; that is right. The dam at that time, as I recall, was the largest in the world.

Senator O'MAHONEY. Do you remember the size, measured in the productive capacity?

Senator ELLENDER. It was 560,000 kilowatts in 1937 when it was completed. There were 9 turbines, 4 of which were manufactured by General Electric, and 5 by the Russians. All the panelings and control works were also made by General Electric. This dam was destroyed during World War II and later rebuilt.

Senator O'MAHONEY. By whom was it rebuilt?

Senator ELLENDER. It was rebuilt by the Russians, with our assistance.

Senator O'MAHONEY. Our assistance given in what way?

Senator ELLENDER. We furnished 3 turbines, and the Russians constructed 6 of the 9 that are now there.

Senator O'MAHONEY. Did we sell those turbines or did we given them to them?

Senator ELLENDER. We gave them to the Russians on rather easy credit, and I think we have been repaid. As I have just indicated, the paneling and the distribution mechanism is also American. I was unable to find out whether this was new material, or whether it had been salvaged. But at any rate, this huge dam was reconstructed and its capacity was increased from 560,000 to 650,000 kilowatts at the present. I had a long talk with the engineer at this facility and he indicated that the Russians were now in the process of building three more dams on the Dnepr River.

Senator O'MAHONEY. Who was this engineer, a Russian?

Senator ELLENDER. Yes, Russian educated, and a very intelligent fellow. He indicated that studies preparatory to building the new dams had been made for the past 4 or 5 years.

Senator O'MAHONEY. Are you giving the inference in this relation of facts that when the Dnepr Dam was first constructed, the job was done entirely by American engineers?

Senator ELLENDER. Yes.

Senator O'MAHONEY. But when it was reconstructed, it was done by Russian engineers?

Senator ELLENDER. Exactly.

Senator O'MAHONEY. But some American turbines made in the United States were used in the construction?

Senator ELLENDER. The Senator is correct. That is what I intended to say.

Senator O'MAHONEY. This indicates that during that period Russian engineering made great progress.

Senator ELLENDER. I wish to say that this Russian engineer that I talked to indicated to me that when the dam was first built they obtained practically all of the technical know-how from American engineers, and that since that time this facility was used as an example of what could be done in other parts of Russia.

Many of the installations that were built at the Dnepropetrovsk facility were really copied into other facilities that were built later, except that the plants were made considerably larger, as I will proceed to show as I go along.

The name of the director was Mr. Pavel Ivanov. He was educated in Russia, and was in complete charge of this plant. He indicated to me that the Academy of Sciences in Moscow had a team of scientists and other people who studied water resources and other natural resources of the country to plan other facilities in the Dnepr River Basin, as well as other portions of Russia.

Senator O'MAHONEY. How old a man was this gentleman?

Senator ELLENDER. About 55 to 56 years old.

Senator O'MAHONEY. Do you know where he was educated?

Senator ELLENDER. In Moscow. He received his primary education in the secondary schools of the small city where he lived. I do not remember the name of the city or town in Russia where he originally lived. But he received his advanced education at the University of Moscow.

The Academy of Sciences, as he stated, made studies of the Dnepr River, and made plans to build three other facilities. At the time of my visit they were on the drawing board and ready to be started.

Senator O'MAHONEY. What was the year?

Senator ELLENDER. 1956. The difficulty they find there is that the terrain is rather level, and quite a bit of good land is covered when lakes are formed in back of dams. It was rather difficult, I was told, to select the proper place so that less property would be taken over behind the dams.

At any rate, they decided at that time to build one at Kakhovka. That was to be a small facility with only 260,000 kilowatts. Then another one at Kremenchug. The amount of power there will be 450,000 kilowatts. The third one, which would be the fourth on the Dnepr River with the one now existing, was to be at Dneprodzerzhinsk. That was to be a small facility also of 250,000 kilowatts. I was told that when all these facilities were completed, their combined turbines and generators would produce 1,610,000 kilowatts.

It was felt, or so Mr. Ivanov told me, that when these upstream facilities were constructed, it would tend to keep the water upstream. Thus all of the dams' reservoirs located below would, of course, have more water and the power potential would be firmed since there would be more and more electricity produced.

Mr. Chairman, I wish to insert at this point a portion of my 1956 diary which pertains to my visit to the project I have discussed.

(The excerpt from Senator Ellender's diary is as follows:)

While driving from Yalto to Kharkov, a brief visit was made to the hydroelectric station on the Dnepr River at Zaporozhe. We were met at the station by its director, Mr. Pavel Ivanov, with whom we talked for more than an hour about Soviet hydroelectric stations in general and the Zaporozhe station in particular.

The hydroelectric station at Zaporozhe first began operating in 1938. It was built by American and Soviet engineers. The plant was originally equipped with 9 turbogenerator units, 5 of which were made in the Soviet Union and the remaining 4 were obtained from the United States. The original plant had a capacity of 560,000 kilowatts.

During World War II the plant was completely destroyed and was rebuilt during the period 1946–50. In reconstructing the plant, they used 6 Soviet-made turbogenerators and only 3 American-made turbogenerators. The capacity of the reconstructed plant was increased by 90,000 kilowatts up to 650,000 kilowatts.

The waterpower used by the plant is equivalent to 14,000 tons of coal per day. The plant operates at full capacity only at night when there is a large increase in the amount of electricity used in homes.

The director was very willing to discuss hydroelectric projects, and in the course of the conversation mentioned that three additional plants would be constructed on the Dnepr River. The location of these plants and their planned capacities in kilowatts are as follows:

	Kilowatts
Kakhovka	260,000
Kremenchug	450,000
Dneprodzerzhinsk	250,000

It is planned to complete the construction of each of the above stations during the sixth 5-year plan (1956–60).

The director mentioned 2 hydroelectric stations which are being constructed in Siberia with each a capacity of almost 5 times as large in terms of productive capacity as the station at Zaporozhe. One of these Siberian stations is located at Bratsk on the Angara River and will have a capacity of 3.2 million kilowatts. The other one is located at Krasnoyarsk on the Yenisei River and will also have a capacity of about 3.2 million kilowatts.

The next really huge dam that I visited was on the Volga River not far from Stalingrad. The Volga River will have, when all facilities on it are completed, eight dams. I visited four of these. It is planned, eventually, to divert 2 rivers that now flow into the Arctic Ocean into the Volga so as to increase its flow, and thereby produce more electricity from these 8 dams.

Senator O'MAHONEY. When did you visit the Volga area?

Senator ELLENDER. In 1956 and also in 1957.

Senator O'MAHONEY. Were these four dams of which you speak constructed when you were there?

Senator ELLENDER. There was the Stalingrad Dam, which is the first that I visited, in 1956. It was started in 1951, but the work on it was stopped after it was started, perhaps a year and a half, and was not resumed until the fall of 1955. I asked the engineer why work had been stopped and then started again. He said, "Senator, the reason why we stopped in 1951 was because we needed the funds for some other purpose."

I asked, "What was that purpose?"

He answered, "That is a political question. I can't discuss it with you."

I said, "Wouldn't you be frank with me and tell me?"

His reply was still, "It is a political question."

I then told him, "I presume you were scared of us and we were scared of you, and probably some of the money for the dam was used for armament."

He smiled and said that the project was resumed in the latter part of 1955. Then I asked why it was resumed, and he said "The Geneva Conference had something to do with that, when your President made the decision that there would be no war, and 'Russia need not fear us,' " and it was then that they restarted the facility.

That is almost the verbatim conversation that we had, based on what I wrote in my diary during my 1956 trip.

Senator O'MAHONEY. Could you briefly state, Senator, the preliminaries by which you arranged to make this inspection tour, and the cooperation or the resistance which you encountered in planning it?

Senator ELLENDER. It was just before I left Moscow in 1955 that I talked to Mr. Mikoyan, who was then third ranking member of the Politburo. I had quite a long talk with him, almost 2 hours, after which he invited me to visit any part of Russia I desired.

I told him then that my trip had already been planned, that I intended to go to Odessa, and to Kiev, and then into Rumania.

Senator O'MAHONEY. Did you have any guides?

Senator ELLENDER. No, not that year. I was alone.

Senator O'MAHONEY. What year was this?

Senator ELLENDER. 1955.

Senator O'MAHONEY. So in 1955 do I understand correctly that Mikoyan invited you to go wherever you desired, and you were permitted to do so?

Senator ELLENDER. Yes, but here is what I did: I told Mr. Mikoyan that my trip had already been completely planned, and that I had other places to go after I left Russia. I asked him to give me a rain-check, so to speak, for the next year, which was 1956.

In the spring of 1956 I wrote Mr. Mikoyan reminding him of the conversation we had the previous year about allowing me to plan my own trip through Russia. Another condition that I imposed was that I be allowed to have my own interpreter. I also told him then that I desired to take pictures of what I saw. He agreed to my conditions, and said that I was welcome to come back to Russia at any time I desired. I arranged to go to Russia in August, as I remember, of 1956.

My guide, by the way, happened to be Horace Davis, whom I had never met before. He spoke fluent Russian, and he was a native of Louisiana, from Jackson Parish; a graduate of Cornell.

Senator O'MAHONEY. What was he doing in Russia?

Senator ELLENDER. He was an attaché there, connected with the Embassy.

Senator O'MAHONEY. With the United States Embassy?

Senator ELLENDER. With the United States Embassy; yes.

Senator O'MAHONEY. He was your guide?

Senator ELLENDER. Yes.

Senator O'MAHONEY. Did you encounter any difficulty with local officials?

Senator ELLENDER. None whatever. I was told, of course, before I left, to take no pictures of army installations, air installations, railroad bridges, trains, and things of that kind. But anything else I

was a liberty to photograph. That year I took about 2,500 feet of film in Russia, and over 9,000 feet in other parts of the world.

Last year, I had occasion to take almost 6,000 feet of film in Russia without any interference from anyone. I obtained permission to visit Russia in 1957 from none other than Mr. Khrushchev. When I spoke to Mr. Khrushchev in 1956 he invited me to come back to Russia and I did. In those three trips, Senator O'Mahoney, it was my privilege to visit the main industrial and agricultural sections of Russia.

In fact, I visited practically all of the large cities in European Russia, as well as the large cities in southern Asiatic Russia. During this last year, I spent most of my time visiting in Siberia.

Senator O'MAHONEY. May I say to the Government observers, the observers from the Department of the Interior, from the Federal Power Commission, and the Department of Agriculture—and I think that includes all the executive branches and commission branches present—you are at perfect liberty at any time you desire to ask any question that would be helpful in understanding the story which Senator Ellender brings back to us from his trips in Europe.

I know that perhaps you are not in a position to testify, except with authority from the departments, but I want it understood that this is a free, open hearing, and the committee desires to have just as much information as it can develop.

That is satisfactory to you, is it not, Senator Ellender?

Senator ELLENDER. Yes, Mr. Chairman.

Senator O'MAHONEY. Would you describe the area that is sometimes called the Pittsburgh of Soviet Russia, which is, I believe, to the east of the Ural Mountains.

Senator ELLENDER. That is correct. I want to direct my testimony now to the Volga River. I wish to discuss first the various projects that are being considered, some having been built and other planned, for the Volga River. I will confine these remarks to the Volga itself, without any of its tributaries, such as the Kama River, where there would be some other projects.

There was a small station completed at Ivanovo, in 1937. That project is very small and has but 30,000 kilowatts. Senator O'Mahoney, that was one of the first efforts of the Russians in this field that they built themselves, with advice from Americans. If you will remember, the one at Zaporozhe on the Dnieper River was constructed almost entirely from information and data obtained from American engineers, back in 1937, or, in fact, long before that.

Senator O'MAHONEY. But American engineers were present or were they not at that time?

Senator ELLENDER. They were present. They were there and they were planning and supervising the work.

Senator O'MAHONEY. They were in charge of it?

Senator ELLENDER. They were in charge of the work. They were directing it altogether. As I stated previously, the Russians used the information that they obtained from the Americans in order to further develop water resources in Russia, to which I will refer in a few minutes.

The second installation on the Volga River was at Uglich. This facility, with a capacity of 110,000 kilowatts, was completed in 1941.

Then another one completed in 1941 was at Shcherbakov, and that facility has a capacity of 330,000 kilowatts.

I wish to say at this time, Senator O'Mahoney, that in the report that Mr. Straus prepared, as well as in my own diary, there may be a little variance in some of these names. For instance, the city of Gorki. Gorki's name was changed only a few years ago, and, by the same token, some of the places where these dams were built were likewise changed. But on the Volga there were eight facilities, as I have just indicated.

Senator O'MAHONEY. Gorki was a name place which may have been changed since you were there?

Senator ELLENDER. Well, no, that was changed before I got there. It was named for one of their famous writers.

Senator O'MAHONEY. What was the original name?

Senator ELLENDER. The city of Gorki was known until 1932 as Nizhni Novgorod. It was changed to honor Maxim Gorki, noted Russian author, who was born there.

I am taking these in order, Mr. Chairman. When I get to Stalingrad I am going to describe that facility in a little more detail. I wish to state that in most facilities that are being erected in Russia today, either manufacturing plants or hydroelectric powerplants, the same pattern as I will describe for Stalingrad is being followed.

The first facility that I visited in Russia this year was on the Volga at Gorki. This dam will produce 400,000 kilowatts. It was started in 1948, and in 1956 the last of its eight turbines was put into place. Each turbine produces 59,000 kilowatts. I saw it in operation this year. I have a description of it here. This part is from my diary, and indicates the size of the dam, when it was started, and its height and size.

The Gorki hydroelectric station, about 65 kilometers up the Volga from Gorki, is 1 of 8 large stations either in operation or planned for operation along the Volga. These stations are Ivankovo (1937), Uglich (1941), Shcherbakov (1941), Gorki (1955), Kuibyshev (1957), Stalingrad (1958), Saratov (under construction), and Chedoksary (planned). We spent an hour with the director and chief engineer of the station, Mr. Ivanov. He discussed existing and proposed power projects in the Soviet Union, and then provided the following information during a tour of the Gorki station:

Construction of the station was begun in 1948 and the first turbine-generator aggregate went into operation in November 1955. There are presently 8 turbines in use, each of which has a capacity of 59,000 kilowatts. The turbines are called the Kaplan type and are modeled after a type developed in Austria. The fins have a diameter of 9 meters (29.5 feet), the diameter of the shaft was 1.2 meters (3.9 feet), and the shaft was 13 meters (42.6 feet) in length. Each turbine uses 500 cubic meters of water per second, which is supplied by a dam that impounds the waters of the Volga. The earthen dam, which is 13 kilometers (8.1 miles) long, creates a lake 16 kilometers (about 10 miles) in width and 440 kilometers (about 275 miles) in length. Average power production will be 1.5 billion kilowatt-hours per year, but a maximum of 2.2 billion kilowatt-hours annually could be produced.

A small town has been constructed at the site of the power station. Here, the people who work in the station and in activities related to the station live. In addition to apartment houses, there is a civic

center, a stadium, schools, and playground. Although neat by Soviet standards, the town seemed to lack all signs of lively dynamic growth. It is more like a set of buildings that have been constructed and filled with working families who might or might not have any cultural ties to the community and who have little or no control over the future of the community.

The next facility that I visited in 1957 on the Volga was at Kuibyshev.

When I first tried to make arrangements to visit that facility, I was refused, because everybody was so busy working to complete it by November 7, to celebrate the 40th anniversary of the Communist Party's rise to power.

Senator O'MAHONEY. What year are you speaking of now?

Senator ELLENDER. I am now speaking of 1957. The revolution was in 1917. November 7 or 8, 1917. But, going back to my difficulties in seeing the Kuibyshev Dam, at first, the powers that be said, "I don't think we can obtain permission for you to see this facility, because the engineers are so busy completing this facility for November 7, that we doubt we can help you. I said, "I came to Kuibyshev for the express purpose of seeing this huge powerplant. I must see it if I have to stay here until after November 7."

Well, anyhow, the mayor at Gorki came to my rescue, I would say, and made a special appeal to the engineer of this huge plant, who, by the way, was as fine a fellow as I ever met in Russia. He was a well-educated person having received his education in Moscow. One of the things that he prized was the fact that he was made a professor of electricity. To be a professor in Russia, I found is a big honor for any man in any profession, be it a doctor, a chemist, or an engineer. Whenever a person reaches a point where he is designated as a professor, that is the height of his ambition.

Anyhow, this engineer took special pains to take us all over the place. The only trouble was that it was a little late in the afternoon, and, since it was very cloudy, I could not take many good pictures. But I did get a picture of the whole facility from about 4 miles away. It shows the huge dam, which is, as I remember it, about 15 kilometers in length.

This facility was started in 1951, and the last turbine was put into place and operation on November 6, I learned later. At this facility there are 20 turbines, each capable of producing 105,000 kilowatts for a total of 2.1 million kilowatts.

Senator O'MAHONEY. Are these Russian turbines?

Senator ELLENDER. Yes. All of them were made in Russia.

Senator O'MAHONEY. Did you have any information about the financing of the project?

Senator ELLENDER. Yes. Several years ago, the Russians raised money to build facilities of this and other types through bond issues. As you may recall, about 3 or 4 years ago, the Government canceled all existing bonds and never paid the owners. I was informed that this method of raising money had been given up and money for construction comes from the treasury of the Russian Government.

As you know, no individual owns anything in Russia, except of course, the clothes he wears, kitchen utensils, and household goods, or, if he is very fortunate, a small car. But there is not a square inch of

land privately owned in Russia, nor is there any kind of privately owned business, not even a bootblack, or a taxi driver. No one can own any kind of facility.

Senator O'MAHONEY. There is no private ownership?

Senator ELLENDER. No, sir; absolutely not. I found out that quite a few engineers and doctors, as well as some mechanics who operate intricate farm machinery, are paid anywhere from $600 to as much as $1,000 per month, our money. I asked, "With all of the surplus money, where do you invest it?" I was told that the only place a Russian can invest his money is in a kind of a savings bank that the Government operates, and this money is loaned out to needy people or people who may wish to build a house on Government land. The rate of interest ranges from 3 to 5 percent. Those who consent to put their surplus money into the saving accounts obtain from that Government-owned institution a small interest return.

Senator O'MAHONEY. Do I understand you to say that the engineers were paid in United States dollars?

Senator ELLENDER. No; it is the equivalent of United States dollars. I was informed that some doctors were receiving 4,000 rubles per month; 4,000 rubles, converted to American dollars, amounts to $1,000. I saw many mechanics on the farms receiving as many as 2,500 rubles to 3,000 rubles per month. If you divide that by 4, you get the equivalent of American dollars.

Senator WATKINS. What about the purchasing power of that kind of money they receive?

Senator ELLENDER. Senator Watkins, the only things that I found cheap, in Russia, were potatoes, turnips, beets, carrots, cabbages, wheat and bread. But meat is very high, although I did find a little difference in the price during my last trip. When I was in Russia in 1955, mutton, beef, and pork were selling at the equivalent of $2.25 a pound, our money, and in 1956 I noticed, as my diary shows, a little lowering of the price, probably 10 to 15 percent. In 1957, the price had gone down to about $1.60 per pound, our money, for meat.

Oils are also rather high. Butter sells for about 80 cents a pound our money. Oleomargarine sells for about the same as butter, and they make it from sunflower seed or cottonseed, obtained from southern Asiatic Russia. They grow in Russia, as you may know, anywhere from 7 to 8 million bales of cotton per year, and from those seeds quite a quantity of oil is produced.

That is where most of the vegetable fat comes from, that and from sunflower seeds.

Senator WATKINS. What about gasoline and clothing, automobiles, that sort of thing?

Senator ELLENDER. You know there are very few cars owned by private individuals in Russia. Take Moscow, for instance, and there in a city of 8.5 million people, there are less than 100,000 individuals that own cars. Most of the cars you see on the streets are used by Government officials, and, of course, all those cars are owned by the Government.

Senator WATKINS. You don't have private cars in Government business at all?

Senator ELLENDER. No. They are all owned by the Government. All the trucks that are manufactured in Russia are owned by the

Government. None are sold privately because nobody can go into the trucking business in Russia.

Most of the gasoline is bought by the state. The price of the gasoline is about 85 to 90 cents a gallon, our money, for those who able to purchase it.

I will come back now to Senator O'Mahoney's question of how hydroelectric power projects are financed. I do not mind being interrupted even though we veer away from the main subject we have met to discuss.

You can readily see, Senator O'Mahoney, that with the Government owning everything, all functions, all stores, and so forth, all the money finds its way into the treasury of the Russian Government.

Each year the planning commission estimates the revenues on hand or to be collected, somewhat along the same line as we do here in the United States, and then they allocate these revenues to specific projects. I did not go into details about armaments in my discussions with Russian officials. I am sure they wouldn't have told me too much about that. But they are expanding heavy industry considerably. However, as I will point out when I get to my review of Siberia, Novosibirsk is expanding greatly in heavy industry.

The planning commission will allocate so much, let us say, for their armed service for defense, and then the next preference on the list may be heavy industry.

After that may be hydroelectric power development, and so on down the line.

Senator O'MAHONEY. Can you compare the cost of hydroelectric development in Russia, the development which you saw, with the cost in the United States?

Senator ELLENDER. I do not remember the exact cost of our Grand Coulee project. The facility at Stalingrad will cost, when completed, 10 billion rubles, which is $2.5 billion our money, and that facility has a capacity of 2,310,000 kw's. I figured out the other day that the cost of producing hydroelectric power in Russia is right around 3 mills.

Senator WATKINS. Did I understand it to be $2.5 billion of our money?

Senator ELLENDER. That is correct.

Senator WATKINS. And yet that figures out to how many mills?

Senator ELLENDER. At about 3 mills. Between, say, 2.5 and 3 mills. I wish to say this to the committee, that there may be a little variance in the testimony that I am giving here as to locations and the size of some of these facilities. As I pointed out earlier, in 1956 I talked to an engineer at the Dnepr facility. He gave me some information as to what I would find in Siberia. But the figures he gave me, which appeared in the minutes of my diary, were at variance with what I afterwards saw.

It was greater than what he told me, as I will point out as I go along.

Senator DWORSHAK. Do they have many steam plants to generate power?

Senator ELLENDER. Yes. Around Gorki they must firm the hydroelectricity power by steam plants. As a matter of fact, the Gorki facility furnishes much electricity to Moscow. I learned from some

of the members of the Academy of Science in Siberia, that they are developing ways and means of transmitting electricity over long distances without too much loss. I was told, and, of course, I cannot give the technical side of it, that they have already built power lines over 1,000 kilometers in length from Gorki on to Moscow and then over the Urals.

They contend that it is necessary to regulate the flow of the stream in order to firm the power. On the Dnepr as well as on portions of the Volga, because it is so level in some areas, it is necessary to build very long dams to provide sufficient storage for a constant flow of water as contrasted with the higher dams located in mountains, as found in the extreme eastern part of Russia.

Senator WATKINS. Do they store large quantities of water to equalize the flow so they can have firm power for generation?

Senator ELLENDER. That is what they hope to do when they complete the building of the 8 dams on the Volga, you see.

Senator WATKINS. The dams they have now built, do they have a great amount of storage in back of them?

Senator ELLENDER. Yes.

Senator WATKINS. Do you have the capacities and storage?

Senator ELLENDER. Yes. I have already placed in the record the storage capacity for the dam at Kuibyshev, which impounds 59 billion cubic meters. That is 59 cubic kilometers of water.

Senator WATKINS. 59 billion cubic meters?

Senator ELLENDER. Yes. Let me put it this way so there will not be a mistake. The dam impounds 59 billion cubic meters of water which, converted to kilometers, makes 59 cubic kilometers. Those are the figures that were given to me.

Senator WATKINS. Do they use any of this water for other purposes than making power?

Senator ELLENDER. Yes.

Senator WATKINS. Do they use it for irrigation?

Senator ELLENDER. Yes. They propose to use a good deal of the water around Stalingrad for that purpose. They have already made arrangements to take care of 100,000 hectares, which is about 250,000 acres, a small area there. The engineer at Stalingrad told me in 1956 that that was only the beginning. They have a lot of fertile land in that area that could become very productive. The thing they lack, of course, is water. When they finish constructing the huge dam at Stalingrad, they propose to irrigate more and more land in that area.

Senator WATKINS. Did they give you any data on the difference in the flow of the river, the fluctuations in the flow of the river?

Senator ELLENDER. I expect to put that into the record in as much detail as I was able to obtain. I am now in the process of talking about the facility at Kuibyshev. Then I will go into more detail as to Stalingrad.

Senator WATKINS. It would be interesting for us to know how the flow fluctuates there, whether they have the wide fluctuations we have, for instance, in our western streams. We have the so-called high-water time, when the snows melt and we have a large stream, and they run down to practically nothing later on in the season.

Senator ELLENDER. Well, they have that condition, too. My recollection is that the production of electricity on the Volga will vary less than 20 percent, from high to low, when all of the dams are completed.

Senator WATKINS. If they have a big storage, that would be the fact, of course.

Senator ELLENDER. They have storage capacity there that covers many, many square miles. As a matter of fact, at one facility, they moved some 40,000 people living in small villages along the river and took it over. The area covered by water was, as I remember, at least 100 miles long, by about 10 or 15 miles wide.

Senator O'MAHONEY. May I ask you this question: I understood you to say when you first began to testify that there were 8 projects on the Volga River, of which 4 had been built or nearly built?

Senator ELLENDER. No; you misunderstood me, Mr. Chairman. I visited four.

Senator O'MAHONEY. You visited 4?

Senator ELLENDER. Yes.

Senator O'MAHONEY. How many had been under construction?

Senator ELLENDER. They were all under construction. There were three that had not yet been completed. At Stalingrad, Saratov, and Vodkin. Those three are now under construction. I was going to come to a discussion of the Stalingrad facility after I got through with the one at Kuibyshev.

Senator O'MAHONEY. This is the question I am leading up to. You spoke of eight contemplated.

Senator ELLENDER. Eight on the Volga; yes.

Senator O'MAHONEY. Of which only four are now under construction?

Senator ELLENDER. Three are under construction and the rest have been completed.

Senator O'MAHONEY. And four you visited?

Senator ELLENDER. That is right.

Senator O'MAHONEY. Then you also said, if I remember correctly, that there was a plan to divert rivers flowing into the Arctic, two rivers, into the Volga, so as to maintain the flow.

Senator ELLENDER. That is right.

Senator O'MAHONEY. When did the development on the Volga begin?

Senator ELLENDER. In the early 1930's.

Senator O'MAHONEY. Before the early 1930's, there was no storage of water on the river?

Senator ELLENDER. None at all.

Senator O'MAHONEY. What was the condition then, if you know, as to the flow of the river?

Senator ELLENDER. I asked about that. They were having a lot of difficulty in navigating the river. You know, there is heavy traffic on the Volga now, and the building of these dams has made it possible to build bigger barges and maintain steady traffic on the river in the summertime.

Senator O'MAHONEY. The Volga boatmen were traveling that river long before the song was written, I suppose.

Senator ELLENDER. Yes; and they had a lot of difficulty, too, may I say, Senator O'Mahoney, about the same as you find on the Ob River in Siberia, which I will come to shortly.

I saw several dredges on the Ob while traveling less than 50 kilometers along the route.

I wish to insert parts of my 1956 diary in respect to the Volga-Don Canal. This may not be pertinent to our discussion, but it will give the committee an idea of what the Russians are doing to perfect river navigation.

(The excerpt from Senator Ellender's diary is as follows:)

The Volga-Don Canal was opened on July 27, 1952. It was named after Lenin. The first boat to enter the canal was the *Joe Stalin*. The canal connected the Volga and Don Rivers with five seas—the Caspian, Black, White, Baltic, and Azov. The network is the longest river-shipping route in the world. It connects the Moscow port with numerous ports on the 5 seas and the 2 rivers.

The canal is 101 kilometers long. It has 13 locks, 3 pumping stations, 13 dams and dikes, 7 spillways, and 2 emergency floodgates. There are 10 docks along the canal and 3 ferry crossings. While constructing the canal there was also built a hydroelectric station with 2 locks and 2 irrigation canals which total 170 kilometers in length. The canal was built in less than 2½ years. Some of the materials used in its construction are as follows: 3 billion cubic meters of concrete, 3 million square meters of stone were laid along the canal, and a total of 1.6 million cubic meters of stone were used in its construction, 60,000 tons of metal were used in the construction of the canal and its bridges.

The Tsimlyansk Sea is a part of the canal system. It holds 12.6 billion cubic meters of water, which can be used for hydroelectric power or for irrigation purposes. In developing the Tsimlyansk Sea, 13,000 people had to be moved to different areas because their homes were submerged.

The Don River is approximately 40 meters higher than the Volga River. In traveling from the Don to the Volga, the total rise in the water level (by means of locks) is 44 meters. Then the water level is lowered (by means of locks) by approximately 88 meters before reaching the Volga. The maximum draft of boats going through the canal is 3 meters.

Senator O'MAHONEY. You spoke of a variation in the flow not exceeding 20 percent.

Senator ELLENDER. I say the productive capacity of the electricity will not vary more than 20 percent when all of the dams are completed. Not the flow of the water.

Senator O'MAHONEY. How about the flow of the water?

Senator ELLENDER. I do not know.

Senator BARRETT. I would like to ask you this question, Senator Ellender. If I heard you correctly, you stated that the Stalingrad project cost about $2½ billion, 2,310,000 kilowatts. That is roughly at the rate of $100 million for a 100,000-kilowatt plant. We are building out in our State there a steam plant of 100,000 kilowatts at a cost of $20 million. The private power puts in 100,000 kilowatts for $30 million, and it costs a little bit more for some of our contracts. How do you account for that wide variation?

Senator ELLENDER. Senator, I am giving you the information that I obtained from the engineer in charge of that plant. Let us not forget that they are also providing for irrigation at that plant. In addition, this will include locks to pass the boats through as well as the cost of the city at the site. All of that is included in that $2.5 billion.

Senator BARRETT. There are a lot of other costs in addition.

Senator ELLENDER. Yes. I did not go into any details about that. I asked what would be the cost of developing the electricity itself, and he told me 1.2 kopeks per kilowatt-hour. There are 100 kopeks as

I remember, in a ruble, and a ruble is worth 25 cents. If you convert all of that, you will find that the cost of developing the electricity would range between, I think, 2½ and 3 mills in terms of our money.

That is the figure I got.

Senator BARRETT. The reason I asked the question was because it seemed to me that the cost of construction over there would be much less than it would be in this country.

Senator ELLENDER. I figured that, too, but I am giving you what the engineer gave me. As I said, they take care of water transportation there, because that is their only method of carrying cargoes in some of those areas. They must take care of river transportation, or else somebody is going to go hungry. They use practically all of their rivers there for transportation.

Senator BARRETT. Thank you very much, Senator Ellender.

Senator ELLENDER. As I said, I tried to get a breakdown of how this two and a half billion dollars would be spent, and the answer given to me was that the cost to produce 1 kilowatt-hour was 1.2 kopeks, which made it between 2½ and 3 mills. That is the best I could get.

Senator BARRETT. There is one other question occurring to me. A moment ago you were telling me about the row crops providing a rather cheap cost of production for Russia, and I was wondering about sugar. They are quite a sugar-producing country. Is that true of their sugar beets and sugar?

Senator ELLENDER. Yes; they produce quite a bit of sugar there, in fact all they need.

Senator BARRETT. And relatively as cheap as these other items?

Senator ELLENDER. Yes; sugar is not very high.

Senator BARRETT. Thank you.

Senator WATKINS. What kind of wages do they pay to the men that work on these projects? How does that compare to what we do here?

Senator ELLENDER. The average for all workers at Stalingrad, as I remember, in round figures, was between 7 and 8 hundred rubles per month. Some of the skilled engineers, a chief engineer, for example, got 5,000 rubles per month. Some of his subordinates got 3,500 to 4,000 rubles per month.

Senator WATKINS. Is their construction almost completely mechanized like it is here on our big dams?

Senator ELLENDER. No; there is a good deal of handwork done.

Senator WATKINS. How would they build dams with so much handwork?

Senator ELLENDER. What I mean is in transferring concrete from one place to another and getting your steel in place. A good deal of that is done by hand, by carrying it there by hand. We use big cranes in this country, to do such work.

Senator WATKINS. We have transmission belts that move the concrete.

Senator ELLENDER. They have those, too.

Senator WATKINS. They do have those?

Senator ELLENDER. Yes. But not as extensive as we do. They use the bucket-type method of carrying concrete also.

Senator DWORSHAK. Do women work on those dams?

Senator ELLENDER. I would say that 50 percent of the workers on these dams are women.

Senator DWORSHAK. Doing the hard labor.

Senator WATKINS. They didn't give you what they paid the ordinary laborers?

Senator ELLENDER. The workers at these dam sites, as I said, are fairly well paid. In addition, as I was going to mention, I intended to discuss all of this in connection with the Stalingrad dam and show you exactly how it works.

My description of the Stalingrad dam applies to almost any other large construction handled by the Government.

Senator WATKINS. I will defer my questions then, if you are going to do that. I didn't know you were.

Senator O'MAHONEY. Senator Ellender, if you will proceed with your description of Stalingrad, we will defer questions until that point.

Senator ELLENDER. That is all right. I don't mind the questions at all, except that I thought we could make it a little more orderly.

Senator O'MOHANEY. That is most desirable.

Senator ELLENDER. At this point, then, Mr. Chairman, I wish to read into the record excerpts from my diary pertaining to the Kuibyshev facility. At this facility, as I said, all of the 20 turbines will be operating on November 7, I was informed. When I visited the site there were 17 turbines in actual operation and two others were being tested. Then the 20th was to be completed on or before the 7th of November, which was after I had left Kuibyshev.

Senator O'MAHONEY. You may proceed, Senator, with your notes on Kuibyshev.

Senator ELLENDER. Kuibyshev hydroelectric project, put into full operation a few days after our visit, will, with 20 turbine generators, be the second largest power station on the Volga. Only the Stalingrad station, which is under construction, will be larger.

Construction of the project was begun in October 1951. According to the chief engineer and director of the project, the development of the dam and power station necessitated solving many difficult engineering problems. The soil structure at the dam site was particularly troublesome as the right bank of the river consists of sand and clay and the left bank of sand.

The station is built on clay; 196 million cubic meters of soil first had to be removed. Sixty percent of the space created by excavation has since been replaced by cement, other building materials, and hydroelectric equipment. More than 7,525,000 cubic meters of concrete have been poured. The cement was manufactured in a plant that was built at the site.

Because the entire flow of the river must pass through the locks, sluiceways, and power station, it was necessary to construct a concrete and steel strainer to protect the project from floating logs and other debris. During the flood period of 1957, 40,000 cubic meters of water per second passed through the project. The dam impounds 59 billion cubic meters (59 cubic kilometers) of water.

At the time of our visit, 17 turbines had been installed, each turbine has a capacity of 105,000 kilowatts; when completed the 20 turbines will give the station a capacity of 2.1 million kilowatts. Daily production will be 30 million kilowatt-hours.

More than 7 billion kilowatt-hours of power had been produced up to the time of our visit. The project is now serving Moscow and the central area of the European territory of the U. S. S. R. via a 1,000 kilometer transmission line with a capacity of 400 kilovolts.

Transmission lines with a capacity of 400,000 volts have already been built from the project into the Ural region. In addition to this, a 1-million-kilowatt transmission line is being built which will serve Saratov and the Urals. (The use of the term "kilowatt" in this connection seems incongruous, but that is the term that appears in notes jotted down at the time.)

When the station is operating at full capacity, the cost of power will be only 1.2 kopeks per kilowatt-hour.

We were told that all equipment used in the project was made in the U. S. S. R. The turbines, for example, were manufactured in Leningrad. More than 31,000 people worked on the construction of the project. A permanent city of apartment houses and community services was built at the dam site to serve the families of construction workers and the people who will remain to work in the station and in industries which will be established nearby. Technical support of the project was provided by the establishment of a branch institute of the Kuibyshev Engineering College at the project headquarters.

Although the chief engineer showed pride in the near-completion of the project, he seemed equally, if not more, proud of his recent designation as a professor.

With the heavy freight traffic that always moves on the Volga, the system of locks for handling this traffic is an extremely important adjunct of the project. The locks, each of which has dimensions of 300 by 30 meters, raise or lower logs and cargo ships 15 meters as they go along the river.

During the month of August 1957 alone, 2.5 million cubic meters of timber passed through the locks. In the first 9 months of 1957, the total movement of logs through the locks was 7 million cubic meters.

That completes the portion of my diary pertaining to Kuibyshev.

Senator O'MAHONEY. It will be ordered so printed. We will make that arrangement.

Senator WATKINS. Much of this material we do not know about, and if it is put in in this fashion, we would like to study it and maybe ask the Senator to come back and explain something further to us.

Senator ELLENDER. I will be glad to.

The next facility that I visited on the Volga was in 1956, at Stalingrad. To give you an idea of how the Russians operate, the dam is being built 21 kilometers north of Stalingrad and before they started building the dam, they erected a new city 2 kilometers from the dam site.

Senator WATKINS. That is the way we do in the West, build our cities first.

Senator ELLENDER. We do not do it that thoroughly, though. This is a permanent city. I saw huge apartment houses being built along wide avenues, lined with trees. In connection with this city they have hospitals and schools of all kinds—kindergartens, secondary schools, and even technical schools, where project workers can go to school in order to prepare themselves for the type of work they will be doing when the Stalingrad Dam is completed.

They also built a huge stadium in this new city for the use of all the workers and their children. They have a lot of tennis courts, places to play soccer, basketball, and all kinds of athletic contests. They also have a large cultural center where workers' children as well as the workers themselves can study music or take up drama. So they have in that area a complete city with theaters, stores, schools, hospitals, and even nurseries, which take care of the children while papa and mama work. All of that is provided for in that one city, and it is all built in connection with the Stalingrad Dam.

After the dam is completed the city will then house workers for the factories made possible by the electricity produced at Stalingrad.

Senator WATKINS. May I ask you one question? Of course, it would be important to know what their climatic condition is. Do they have sufficient rainfall to take care of the trees and whatever they plant around the city, or do they irrigate?

Senator ELLENDER. They irrigate to some extent. The rainfall around Stalingrad is between 14 and 18 inches, as I remember.

Senator WATKINS. Is it pretty well spread over the years?

Senator ELLENDER. No. That is the trouble. Sometimes it fails a little too much in one season compared to the others, and the crops suffer. But the trees that I did see there had a trench around them, into which they poured water, the same as you do out West where you have to irrigate trees.

Senator WATKINS. Do they have canals and irrigation ditches or do they pump?

Senator ELLENDER. They pump the water through mains for that purpose there.

Senator WATKINS. This is around in the city itself?

Senator ELLENDER. That is correct. Now, when the dam is completed, they will have an irrigation system. In fact, they are working on that project now. Just as they are also working on the locks for navigation and the development of electricity. In other words, the work progresses in all phases at the same time.

Senator WATKINS. Do you know whether or not this was an agricultural area prior to the building of the city?

Senator ELLENDER. Where the city is?

Senator WATKINS. Yes, where the new city is.

Senator ELLENDER. Well, yes, there were some crops grown around there. I would say however that, within 100 kilometers of the city of Stalingrad itself, there is quite a dry area. I saw quite a few farms when I visited around Stalingrad. But the production is very uncertain because of a lack of water when they need it. On the other hand, in some areas where the land is a little low and where they are able to conserve the moisture, they grow pretty fair grain crops.

Senator DWORSHAK. Senator, are these workers on these projects organized into any kind of labor unions?

Senator ELLENDER. Yes. Every worker at this facility, as well as any other facility in Russia, belongs to a union. As I pointed out in my diary, unions fix the minimum wage.

Every worker must receive the minimum wage. Khrushchev, for instance, as powerful as he is in Russia, could not hire somebody to work at his house unless he paid the minimum wage fixed by the union. The same thing prevails at any facility within Russia. The

wages are fixed, depending on the class of work that is done. Of course, all of these labor unions are separate entities, but they operate under Government fiat.

Senator WATKINS. Well, the Government directs the unions.

Senator ELLENDER. That is correct.

Senator WATKINS. That is part of the Government system.

Senator ELLENDER. Yes. There is no doubt about that. But it is a separate entity. They bargain, let us say, with the ministry that has to do with the building of the facility at Stalingrad.

Senator WATKINS. Who determines what they ask for?

Senator ELLENDER. Well, it is by negotiation.

Senator WATKINS. Who determines the policy before a labor union goes into ask for a raise on their wages? Who determines that policy? Is it the Government?

Senator ELLENDER. Of course, it is all Government, Senator. It all boils down to Government. But the labor unions do see to it that all workers, let us say at the Stalingrad Dam, are paid in accord with whatever wage scale is fixed by the union and the ministry that is building this facility.

Senator WATKINS. If it is part of the Government, it is the Government negotiating with itself, then.

Senator ELLENDER. That is what it amounts to.

Senator WATKINS. That is what I wanted to find out.

Senator ELLENDER. That is what it boils down to. As I said a while ago, everything in Russia is Government. The individual does not own anything. Yet they have some ways and means of fixing these wages, with minimums, and the labor unions have the authority to see to it that the workers receive whatever salaries are agreed to. It may all be Government, but still there is a method of fixing wages which must be adhered to. In other words, you have a segment of Government seeing to it that the laboring class is paid what is promised by the ministry, which is erecting the facilities.

Senator WATKINS. Do they ever have deadlocked negotiations under that system?

Senator ELLENDER. I don't know, Senator. I didn't go into that.

Senator CARROLL. Once the workers are assigned to an area like Stalingrad to work on that sort of a project, it is a sort of a conscription, is it not? They are assigned and that is where they stay until things are completed?

Senator ELLENDER. They are invited to come there, and are not forced. I asked that very question, Senator. But I did find that after they take a job, it is hard for them to move away from it.

Senator CARROLL. Is it difficult for them?

Senator ELLENDER. I was informed that if the worker desires to change his job, he must give notice, and after 2 weeks he finds out whether or not he can move. I was told that changes were made quite a few times when it was found that some people could do another job better than the one they were doing. But ordinarily, it is rather difficult, when a person is taught, let us say, to work around machines in a cotton mill, or if he is a mechanic working in heavy industry, to change jobs. The reason I was given for this situation was that the Government feels that it has an investment in the worker. After the worker graduates from a preparatory school—the equivalent to our

high school—then he attends an institute maintained by his factory where he can take courses on how to do a better job.

Senator CARROLL. But there is no real free movement?

Senator ELLENDER. No, indeed. The workers cannot go from one job to another after they are first employed. They have to get permission. They have to give notice that they want to go from one plant to another. Of course, they have a lot of difficulty because it is usually a transfer from one Government job to another.

Seantor O'MAHONEY. Now, Senator, I am going to try to assist you to complete the story about Stalingrad without getting off and on these other tangents, which are tremendously interesting. You should take satisfaction out of the questions that are being asked of you.

Senator ELLENDER. I do.

Senator O'MAHONEY. But it is 7 minutes to 12. I am going to ask you to proceed to the completion of your story on Stalingrad, the Stalingrad plant. I am going to ask the members of the committee to abstain from asking any questions until you finish that.

Senator ELLENDER. That is all right, Senator. I am only too glad to answer any questions that come to their minds. I am happy to do it.

Senator WATKINS. After he lifts the curtain and we see all of this, Mr. Chairman, and he has our curiosity aroused, I hope you let us ask questions then.

Senator O'MAHONEY. Certainly.

Senator ELLENDER. I will be glad to answer any questions. There are some that I cannot, I know, but I will make every effort to answer any question.

Senator O'MAHONEY. The reason I said that is because I have a letter from Senator Neuberger here, expressing his great regret about being unable to be present. He has other committee meetings this morning and this afternoon. I am trying now to enable you to finish your discussion of the Volga, if you can.

Senator ELLENDER. All right.

Senator O'MAHONEY. After you complete that, then the transcript will be made available to the members of the committee, and you will be back for questions later on.

Senator ELLENDER. Fine.

Senator O'MAHONEY. Thank you.

Senator ELLENDER. To complete Stalingrad, I do not have too much to add.

First, Senator O'Mahoney, going back to your question dealing with the director of the Dnepr Dam, I asked him in particular about his background, where he was educated, and how long he had studied.

Senator O'MAHONEY. That is all in the record.

Senator ELLENDER. Yes. Or it can be furnished.

Senator O'MAHONEY. You did answer that question.

Senator ELLENDER. There is one point I wish to make. This man is all Russian. He attended Russian schools, and got his degree from the electrical school in Moscow. This engineer also paid tribute to American ingenuity, and said that a lot of information gathered by him and others from American engineers when they built the Dnepr Dam at Zaprozhye was of great benefit to them. He said what they are doing now is really improving on what they learned from us, as I will show as I describe my visit to Siberia.

At the Stanlingrad Dam, the first generator will go into operation in 1958 and the entire project is to be completed by 1960. The capacity of this plant when completed will be 2,310,000 kilowatts, slightly larger than the Kuibyshev project I have previously described.

(The excerpt from Senator Ellender's diary pertaining to the Stalingrad Dam is as follows:)

NOTES ON VISIT TO THE HYDROELECTRIC STATION NEAR STALINGRAD, AUGUST 15, 1956

The hydroelectric station now under construction near Stalingrad is part of a network of plants to be constructed on the Volga River. Other stations are being built or will be built on the Volga River at Kuibyshev, Saratov, Chedoksary, Gorky, and Astrakhan. The station at Stalingrad, which will produce about 2.3 million kilowatts, will be the largest on the Volga.

The Stalingrad plant, when completed, will have 22 aggregates (turbines and generators). The seasonal variation in the output of electricity is not expected to exceed 25 percent and may be even less as more dams and hydroelectric stations are constructed along the Volga which will tend to stabilize the supply of water. The output of electricity from the plant will go into a European-type circular system which will supply electricity to Moscow, the Urals, the Donnets Basin, the Volga region, etc.

The dam across the Volga at the site of the Stalingrad hydroelectric station will be 5 kilometers long, of which 3 kilometers will be made of earth. The dam will raise the water level approximately 26 meters, which will flood an area of about 3,000 square kilometers. In flooding this area, 100 communities with a total population of between 35,000 and 40,000 people will have to be moved to other areas. The Government will provide living accommodations for the people being displaced. The assistant chief engineer of the construction project who conducted the tour, Mr. T. A. Medvedev, said that it was originally planned to build the Stanlingrad station during the period 1951–55; however, the project was delayed because of a "delay in the arrival of the Spirit of Geneva." In illustrating the bigness of the construction project, the engineer quoted the following data on materials, machinery, and manpower being used to construct the station: 6.5 million cubic meters of concrete, 375,000 tons of metal, 150 million cubic meters of earth will be moved and used in constructing the dam, 1,000 dump trucks, 110 excavators, a network of overhead elevators, and a labor force of 25,000 workers.

It is estimated that the total cost of constructing the station will be 10 billion rubles. The first generators will go into operation in 1958 and the entire project is to be completed by 1960.

The water reservoir above the dam, estimated at 33.6 billion cubic meters, will make it possible to irrigate large areas of agricultural land in the regions of low rainfall. Mr. Medvedev said that plans had been developed for irrigating 100,000 hectares and that this was only the beginning.

In reply to questions concerning the production of electricity with atomic energy, the engineer said that by 1960 the Soviet Union would be producing between 1.5 and 2 million kilowatts of electricity from atomic energy. He stated that the cost of 1 kilowatt of electricity produced from steam or atomic energy was about 10 kopecks, whereas hydroelectric stations produce the same amount of electricity (1 kilowatt) for 1 kopeck.

Along with the construction of the hydroelectric station near Stalingrad, a new town has been built on the east side of the Volga River, adjacent to the station. The town was built over a 2-year period, and now has a population of more than 40,000 people. The name of the town is Volgarski. Part of the inhabitants of the new town came from villages which will be flooded when the dam is constructed. The new town will house the hydroelectric station employees and, also, workers for new industries which will be established in the area following the completion of the hydroelectric station. The new town is completely modern, by Soviet standards. It has running water, gas, electricity, a new stadium, a theater, and several parks. A brief tour was made of the city, which included a visit to the new theater. It seats 860 people, and will be used by professional as well as amateur groups. The director of the theater explained that they had already organized several amateur groups of dancers and singers from among the local workers and schoolchildren.

The personnel with whom we talked, including the city officials and the engineers at the hydroelectric station, were very enthusiastic about the station. The engineers were particularly well versed on hydroelectric stations in the United States and, like the engineer at the Kharkov electrical construction factory (see enclosure 16), expressed confidence in the ability of the Soviet Union to fully develop the hydroelectric resources of the country. These officials, like all other Soviets with whom we talked, emphasized the desire of the Soviet people for world peace.

The next dam under construction is at Saratov, and that facility will generate 1 million kilowatts. The final dam, which is now under construction, is the 970,000-kilowatt facility at Vodkin.

Now, I go back to my earlier statement Senator O'Mahoney, that you may find a little variance in the names that I have given, but that is due to a change in the names since they started some of these facilities. But the entire capacity at these 8 facilities will be 7,250,000 kilowatts, for a total of 63.5 billion kilowatt-hours per year.

You will find in my diary that the engineers I talked to said the entire production would be 65 billion, but I had a member of my staff in Washington figure it out and he said that according to the capacity given to me, the entire production per year would be 63.5 billion kilowatts. As I said, that relates to the Volga only. Now I will describe activity in Siberia for a little while.

Senator WATKINS. You are going to tell us how you work that, aren't you; how they built Stalingrad? I don't want you to pass that up. I am very much interested in that. You were going to show the work and everything in connection with it, it being the model you were going to use to explain it.

Senator ELLENDER. The matter I had in mind was the way they built cities around their new facilities. That is what I meant. They complete a facility, not only for the building of the dam, but also to house the people who will work in that locality after they obtain the electricity to operate the factories they plan.

I have motion pictures of the Stalingrad facility that I took, indicating this, and I will be glad to show them to the committee. The pictures show the large cables built across the river, on which they haul materials of all kinds. I was told that they have to transport the rock used to build this dam over 100 miles. They got the sand nearby, but the rock is crushed and then carried over 100 miles to the dam site.

Senator WATKINS. Do they have rails and trucks?

Senator ELLENDER. Yes; railroads. They used small dump cars on a specially built railroad.

Senator WATKINS. This is flat country, is it not?

Senator ELLENDER. Yes.

Senator WATKINS. And there are no mountains?

Senator ELLENDER. No.

Senator O'MAHONEY. Senator Carroll?

Senator CARROLL. Before you leave the Volga, do I understand that 62.5 billion kilowatt-hours——

Senator ELLENDER. 63.5. That will be the capacity of the eight dams, when completed.

Senator CARROLL. Did they indicate that that would be its full potential?

Senator ELLENDER. Yes.

Senator CARROLL. Of the Volga?

Senator ELLENDER. Of the Volga, alone. That doesn't include the tributaries. They are going to build six more facilities on the Kama and other tributaries emptying into the Volga. But those are only in the planning stage. They have only 1 built on the Kama River, which empties into the Volga, and that facility has a capacity of 504,000 kilowatts.

Senator O'MAHONEY. May I ask you this question, Senator. Does the plan for the Volga, which you have described to us so far this morning, involve the full potential development of that stream, together with the diverted water from the two rivers?

Senator ELLENDER. Yes.

Senator O'MAHONEY. That is all?

Senator ELLENDER. That is right.

Senator O'MAHONEY. Were you told that that represents the full development of that area?

Senator ELLENDER. Of the Volga River. They are working, as I said, on the tributaries that flow in the Volga.

Senator O'MAHONEY. Do I understand that the purpose is to develop the full potential of the rivers in Russia and in Siberia?

Senator ELLENDER. There is no question about it, Senator.

Senator O'MAHONEY. How far have they proceeded?

Senator WATKINS. What is the installed capacity?

Senator ELLENDER. I was going to get to that when I come to a discussion of the dam at Novosibirsk.

Senator O'MAHONEY. You get to it, at your convenience.

Senator ELLENDER. During my trip last year I flew over the Ural Mountains into Siberia from European Russia. As a matter of fact, that was my first visit into what you might call real Siberia. That is, it forms a part of the huge Siberian Republic, of which Moscow is the capital as well as being the capital of the entire U. S. S. R. I flew from Kazan, over the Urals, and clear on to Irkutsk. This is near Lake Baikal, which is about 400 miles long, 50 miles wide, and a little over a mile deep. This lake is nestled in the mountains and there is no level land around it. Into this lake empty 368 rivers and creeks, with only 1 outlet, the Angara River. So, it is a natural for waterpower development. I do not believe I have read about or have seen anything like it anywhere in the world.

The first facility I visited is being built now, near Irkutsk. That facility was started in 1951—it was a slow starter, I was told—and when completed, will have 8 turbines, each with a capacity of 82,100 kilowatts, for a total of 660,000 kilowatts.

The first turbine was put into operation in 1956, and at present there are two in operation. Four turbines will be completed this year, and two more in 1959. That makes a grand total of eight turbines to be completed at the end of 1959. The erection of the dam south of Irkutsk will cause the water in Lake Baikal to rise 1 meter, or 39 inches.

They plan making more navigation possible on this lake. You see, there is a lot of timber that grows up to the waterline, and there is a big fishing industry, as well. In time they plan to build locks, so as to facilitate water transportation.

(The portion from Senator Ellender's diary pertaining to the Irkutsk hydroelectric project is as follows:)

IRKUTSK HYDROELECTRIC PROJECT

The Irkutsk hydroelectric-power dam is the first of several to be completed on the swift Angara River, which flows out of Lake Baikal. Although the dam is completed, only 2 of the 8 turbines that will complete the project have gone into operation. Four turbines will be installed in 1958 and the final 2 in 1959. Each turbine has a rating of 82,100 kilowatts, giving the station a capacity of nearly 660,000 kilowatts when completed. The station will have no concrete spillway. Instead, it will receive the full thrust of the impounded river and all waters will go through the turbines, unless during infrequent flood periods excess water may be released through special sluiceways that have been built in the powerhouse itself.

The water falls 24 meters (79 feet) from the level of the impounded river to the bottom of the dam. The turbine shaft is 24 meters in length and 1.4 meters (4.6) feet in diameter. The turbines were manufactured in Kharkov and the generators, which are 13 meters (42.6 feet) in diameter, in Novosibirsk.

The Irkutsk Dam will raise the level of the Angara River and even, we were told, raise the level of Lake Baikal by 1 meter. As the Angara is the only outlet of Lake Baikal, the power station will be assured of a full-water supply that can, if needed, keep the turbines working at full capacity the year around. When raised, the Angara River will be navigable from Irkutsk to the lake and, thus, provide a better means of bringing logs and other products from the lake area to the city for processing. A series of locks are planned at the dam site to take advantage of this improved access to the lake.

Senator ELLENDER. Then on the Angara River, as you come to Bratskaya, that is another large facility now under construction.

When that facility is completed it will have an installed capacity of 3,200,000 kilowatts. Before going to this place, I inquired about it at Novosibirsk, which is in central Siberia, and was told definitely the number of turbines that would be installed. The first information I got was that it would have between 12 and 15 turbines, ranging in capacity from 200,000 to 300,000 kilowatts for each turbine. But I learned in Novosibirsk that they were going to install 16 turbines, each capable of producing 200,000 kilowatts. I saw some of these turbines being built. I also saw the foundations and the plans for the 300,000-kilowatt capacity turbines which will be used at Krasnoyarsk, on the Yenisei River.

The Angara River flows into the Yenisei River, and right near Krasnoyarsk is where they are going to build the dam. They have the drawings already made, from what I could understand; the exact location has already been determined and the borings have been made. I learned this from some of the engineers connected with the Academy of Sciences, with offices in Moscow and a branch in Novosibirsk. When this branch of the Academy was established in 1944, there were only 24 scientists connected with the Academy, and now they have over 700 who are studying the resources of Siberia.

One of these scientists in fact told me, in the presence of Tom Venables, from the United States Embassy in Moscow who was with me, that although this area in Russia constituted around 2 percent of the area of the world, that it contains over 10 percent of the hydropower potential of the whole world. How they figured that out, I don't know, but I took the notes down as I went along.

These studies have been made and are being made. They also cover waters further east, say the Lena River. That is also taken into consideration.

Senator O'MAHONEY. What confidence do you place in the statements that were made to you by these engineers?

Senator ELLENDER. Senator, I do not know, except that I am very much impressed with what they are now doing. If you had come to me before I visited Siberia, and said to me that they are building turbines that will produce 300,000 kilowatts when our largest is 105,000, I would have said, "Well, you just don't know what you are talking about. I don't believe you."

But it is a fact that Novosibirsk, which is now becoming the center of manufacturing in Siberia, is developing by leaps and bounds. It is expanding like a city I have never seen anywhere. Novosibirsk back in 1905 was a little trading town of about 2,500 people.

By 1939 it grew to 160,000 people, and now it is over 800,000 people, all being attracted there by the huge development of heavy industry that is taking place in that area.

Senator O'MAHONEY. And you were there?

Senator ELLENDER. Yes. I have pictures of factories that manufacture the turbines that will produce 200,000 kilowatts.

(The portion of Senator Ellender's diary pertaining to the Novosibirsk hydrolectric project is as follows:)

NOVOSIBIRSK HYDROELECTRIC PROJECT

Construction of the hydroelectric station south of Novosibirsk on the Ob River was begun in 1951 and is scheduled to be completed in 1959. Every effort was being made to get the first of the station's 7 turbines and generators in operation by November 7, 1957. By the end of this year (1957) 3 generators are scheduled to be working. When completed, the seven aggregates will give the station a capacity of 400,000 kilowatts. A total of 5,200 employees work on the project, which includes the construction of a dam 5 kilometers (3.1 miles) in length. The waters impounded by the dam form a lake that is 1,300 square kilometers (508 square miles) in area. At the station, the water will fall 17.5 meters (57.4 feet), passing through each turbine at the rate of 500 cubic meters per second.

The generators used in this project are 13 meters in diameter, the same size as those in the Irkutsk station, but the power output per generator at about 57,000 kilowatts will be considerably less than in Irkutsk. The weight of each of the rotors is said to be 410 tons.

Senator O'MAHONEY. In other words, you, yourself, have seen the evidence, and you have pictures to show, that an 800,000 population community is rising in this area?

Senator ELLENDER. Yes, sir. Positively. That can be stated this way, Senator.

The rapidity with which Novosibirsk has been growing makes housing there very difficult. For instance, I have pictures from Novosibirsk showing vacant ground which in 18 months will become a housing development. I have pictures showing how they build these huge dormitories for men and women.

Senator O'MAHONEY. What you are saying to us, Senator, if I understand it, is that you have, yourself, seen the results of the efforts of Soviet Russia to develop heavy industry with hydroelectric power, and all other aspects of a great metallurgical and chemical industry in this area which you say comprises about 2 percent of the area of the globe.

Senator ELLENDER. That is right.

Senator O'MAHONEY. But it has 10 percent of the potential water supply.

Senator ELLENDER. That is correct. That is what I was told. Whether that is correct or not, you can judge as well as I can. But when I go there and see with my own eyes what I didn't believe existed before I went there, it makes me think that there may be a little truth in what they are saying. Take the facility over at Bratskaya. The Russians have a unique method of publicizing the things they are doing. For instance, when they broke ground at Bratskaya, they had hundreds—in fact, thousands—of people there. I saw movies of it. You see people chopping down trees, and then the machines at work. Every time anything spectacular is done at any of these places, pictures are taken and shown throughout Russia. I was also shown pictures of the Irkutsk project.

What they do, Senator O'Mahoney, is to take pictures of the work as it progresses. At the river closure, they had thousands of people at Irkutsk, and speeches were made to the people. The best workers were rewarded. I saw any number of them with medals on their chests. I can show you some pictures I took of them. Some were given certificates or diplomas, and all were told "That is yours, you did it."

These pictures are shown throughout Russia, with the statement of "If what you see is capable of being done at Bratskaya, you can do it at Omsk, and other places," and that is how they keep up the morale of people, to make them go forward. They are told: "That is yours. You did it."

Senator WATKINS. I am curious as to the type of industries they have at these places, such as the one near the lake you have been talking about. What kind of industry do they have there?

Senator ELLENDER. They don't have any industries at the lake itself.

Senator WATKINS. But how about down the stream, at the powerplant?

Senator ELLENDER. They have industry at Irkutsk——

Senator WATKINS. Where is this 800,000 population?

Senator ELLENDER. At Novosibirsk; it is not shown on the map before us.

Senator WATKINS. I thought you were talking still about the lake area.

Senator ELLENDER. No.

Senator WATKINS. Where is this 10 percent of the world's best water supply?

Senator ELLENDER. I was talking about Siberia, and the Krasnoyarsk area, which is in Siberia, in particular.

Senator WATKINS. Let's get this located.

Senator ELLENDER. I repeat, I am talking about Siberia—the Krasnoyarsk area therein.

Senator WATKINS. You were going on from this one definite location. You mean the whole thing.

Senator ELLENDER. I thought I made it plain.

Senator WATKINS. You have now, but I didn't think you did before, Senator. You were very enthusiastic, when you got going describing your trip, and it was very informative. I thought if they had that much there, what have they in the rest of it?

Senator ELLENDER. I have been talking about Siberia all this time. My report states exactly the area contemplated, and I use not only my observations, written on the spot, but I have the notes in my report

here of Tom Venables, a fine fellow from South Dakota, who took noations as I did. In order for the Appropriations Committee to be able to compare what I said and what he said, you have both in printed form. He heard as I heard. That is in my report. I would suggest that members of the committee read that part of my report pertaining to Siberia, and in the appendix you will find the notes taken by Tom Venables, an American, who accompanied me. You can get his views as well as mine. I don't believe you will find much variance between his statement and my statement.

Senator WATKINS. Is there any industry located in or around that lake?

Senator ELLENDER. No, sir, not around the lake itself. I traveled on the lake which is the source of the Angara River. We come from Irkutsk to the lake. About 50 miles from where the lake empties into the Angara River a branch of Irkutsk University is located. I met quite a few college girls and boys who were studying the mysteries of this lake. I was informed that they were experimenting in an effort to find the best kind of food for fish in the lake. I found at the source of the Angara River, a fish collective where people were engaged in catching fish for the market.

Senator WATKINS. Where do they use the electricity that is generated in these plants on the river?

Senator ELLENDER. They use that around Irkutsk.

Senator WATKINS. How big a city is that?

Senator ELLENDER. About 350,000 people.

Senator WATKINS. What industries do they have there?

Senator ELLENDER. There is a large tea factory where they pack and grade tea. They have food-processing plants and paper mills. They manufacture mining equipment as well as heavy industry of many varieties. There is a lot of gold around Irkutsk, and they build large dredges there in order to mine the gold. They also have, as I recall, and I may want to correct this, several cotton mills and sawmills.

(Senator Ellender subsequently furnished information to the committee showing that the cotton mills were located at Bannaul.)

Senator WATKINS. Do they grow cotton in that area?

Senator ELLENDER. No; the cotton is brought from Tashkent.

Senator WATKINS. That is a long way from this area.

Senator ELLENDER. They bring it there.

Senator WATKINS. What transportation means have they?

Senator ELLENDER. Railroad and water.

Senator WATKINS. I don't see any water?

Senator ELLENDER. I am sure they don't fly it there, Senator.

Senator WATKINS. I am sure of that, too. That is why I was trying to find out what the transportation was.

Senator ELLENDER. If we had a more complete map than the one we are using, you could see.

For instance, they grow no tea at this lake area, but all of it that they pack comes from the Carpathians, from around Georgia and Usbek.

Senator WATKINS. And they send it to Siberia to be processed?

Senator ELLENDER. Yes, sir; they certainly do.

Senator WATKINS. And then send it back again for use?

Senator ELLENDER. Well, I suppose so, Senator, the same as we do.

Senator WATKINS. How far is that?

Senator ELLENDER. About 3,000 miles, I guess, 3,500 miles. Russia produces, I was told, 75 percent of the tea that they consume, and tea is their main drink.

The climate is very cold. A glass of hot tea is what is relished during the cold weather. I have pictures of the factory.

Senator WATKINS. What do they do in this factory with the tea?

Senator ELLENDER. They dry it. They grade and pack it.

Senator WATKINS. I thought you said processing.

Senator ELLENDER. They pack and dry it. Have you ever been in a tea factory?

Senator WATKINS. No; I haven't.

Senator ELLENDER. They get tea in bulk. What they do is——

Senator WATKINS. Put it in the little bags?

Senator ELLENDER. For the most part, in Siberia, they use caked tea. That is, they grind it and make a cake of it. I describe the process in my notes. Each cake it about 4 by 5 inches and about three-fourths of an inch thick.

If you want to know what kind of transportation facilities there are in Russia, I would say that they are very, very poor.

Their main railroad, of course, is the Trans-Siberian, and none of their trains go faster than, say, an average of 22 to 25 miles.

Senator WATKINS. A single-track railroad?

Senator ELLENDER. Yes; except near large cities where they have sidings, or in between where they may have sidings.

Senator WATKINS. They have heavy winters in that country, don't they?

Senator ELLENDER. Yes. But the railroad equipment is very poor. Take the freight cars, for instance. There are some that may measure 20 feet in length, all open, with small wheels, and others that may be 30 feet in length, and some of them 60 feet in length. A good many of them are antiquated. They have fairly good truck transportation about cities, but not much truck transportation connecting large areas, except in European Russia.

Senator WATKINS. They don't have paved highways between their cities?

Senator ELLENDER. In some, yes. For instance, I proceeded from Moscow clear down to Yalta on a black-top road. It was not as good as our roads, but it was a passable road, though a little holey in places.

Senator WATKINS. They don't have any side paved highways running into it, do they?

Senator ELLENDER. Only from cities.

Senator WATKINS. That ties in with what I heard from other travelers, people from my own State, too.

Senator ELLENDER. Yes. The automobile transportation there is, of course, limited.

Senator O'MAHONEY. I am afraid, Senator, that we will have to recess this meeting at the moment. Let me say in declaring the recess that, for the committee, I express my deep appreciation of your willingness to come here and tell this fascinating story of your trip. You have learned so much, and you remember so much, that you keep jumping ahead of us faster than we can follow you.

The members of the committee will want to interrogate you later on.

Senator ELLENDER. This is such a large assignment, Senator, that

I am going to have to probably read over some of my diary again to be better acquainted with each locality.

I don't want to misrepresent anything. I want the record to show just exactly what I saw there.

Senator O'MAHONEY. Let me ask if I summarized this correctly, that you have this morning drawn the picture of a government in the process of making a drive for the industrialization of an area which 50 years ago was without industry and power.

Senator ELLENDER. The Senator is exactly correct.

Senator O'MAHONEY. You do not mean to tell us that the Soviets, in Europe and in Asia, have at this time reached the goal for which they are striving, but that they are on the way.

Senator ELLENDER. Yes, sir; that is exactly what I mean to say. And the resources there are unbounded. I never saw anything like the coal, the gas, and the oil and various minerals.

Senator O'MAHONEY. They have the potential, but it has not yet been developed.

Senator ELLENDER. That is correct. There is something else I would like to stress about Siberia. When I went there, I thought I would see there a mixed race of Mongolians, Tartars, and what have you, but I wish to say to you and to this committee that the people I saw in that area I am describing to you were people just the same as the pioneers that made America great.

They are all of European descent. I inquired, and asked, "What became of the Mongolians and the Tartars that were here?"

Nobody could give me an answer. I asked, "Why have you so many around the lower central area of Russia?" I got no answer. How they did it, I don't know. I asked but I couldn't find out. But the people in Siberia where I visited, as I said, remind me of our own pioneers that we read about. They are all of European descent.

Senator O'MAHONEY. I want to have the record show that the part of the map to which the Senator was pointing, as he made the statement, is the area just east and south of the Caspian Sea.

Senator WATKINS. As I understand it, Senator, you are talking about the Mongolians having been moved down to where Senator O'Mahoney has referred to?

Senator ELLENDER. That is around in this south central area south of Siberia, yes.

Senator WATKINS. They have been moved there?

Senator ELLENDER. That is where I saw them in 1956. I was surprised not to see them in their original habitat. I was told that there are some Mongolians in the Vladivostok area, in the rice fields, where they produce a lot of rice and a few in the northern section of eastern Siberia. But all of the central Russian area of Siberia is occupied by people of European descent.

Senator O'MAHONEY. May I say, before recessing that tomorrow morning I will start this meeting at 9:30. Mr. Ellis was unable to go on today, so I will begin in the morning. Major General Itschner, Chief of Engineers, is scheduled for tomorrow, as is also Senator Jackson, and after General Itschner, Senator Ellender, if it is agreeable to you, you may resume the stand.

Will that be satisfactory, for tomorrow?

Senator ELLENDER. Will that be tomorrow?

Senator O'MAHONEY. We will begin tomorrow morning at 9:30 I have to try to finish this tomorrow.

Senator ELLENDER. Senator, will you notify me when you are ready? I must be present at the cotton hearings before the Committee on Agriculture and Forestry. However, I would like to say at this time that I appreciate the opportunity afforded me to discuss these matters with the committee. I am delighted that so much interest was shown by the committee members in subjects other than water resources.

Senator O'MAHONEY. Certainly. We will advise you. There is another meeting on Wednesday of another committee, which I must attend. I will try to finish this hearing tomorrow. I will try to get permission to sit during the afternoon if the Senate is in session tomorrow afternoon. We will now stand in recess until 9:30 tomorrow morning.

(Whereupon, at 12:35 p. m., the hearing was recessed, to reconvene at 9:30 a. m. Tuesday, February 18, 1958.)

WATER RESOURCE DEVELOPMENT

TUESDAY, FEBRUARY 18, 1958

UNITED STATES SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
AND COMMITTEE ON PUBLIC WORKS,
Washington, D. C.

The joint session convened, pursuant to recess, at 9:30 a. m., in room 224, Senate Office Building, Senator Joseph C. O'Mahoney presiding.

Present: Senators Joseph C. O'Mahoney (Wyoming), James E. Murray (Montana), Robert S. Kerr (Oklahoma), Henry M. Jackson (Washington), Arthur V. Watkins (Utah), Henry C. Dworshak (Idaho), and Frank A. Barrett (Wyoming).

Also present: Richard L. Callaghan, chief clerk; Michael W. Straus, consultant; Goodrich W. Lineweaver, staff assistant for reclamation; Milton C. Mapes, Jr., staff member, Committee on Interior and Insular Affairs.

Senator O'MAHONEY. The committee will be in order.

Mr. Ellis, will you come forward, please?

We will proceed with the testimony of Mr. Clyde Ellis, general manager of the National Rural Electric Cooperative Association.

STATEMENT OF CLYDE T. ELLIS, GENERAL MANAGER, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION; ACCOMPANIED BY CHARLES A. ROBINSON, JR., STAFF ENGINEER

Mr. ELLIS. Mr. Chairman and members of the committee, in my opinion, the matters being considered by this subcommittee pursuant to Senate Resolution 248 are among the most important that will come before the Congress this year. The preliminary investigations of the committee staff and the notable report submitted by the senior Senator from Louisiana, Mr. Ellender, yesterday, conclusively demonstrate to me the perilous condition relative to abundant electricity and international influence into which our Nation's water resources development program have been plunged by the administration's decision to abandon Federal responsibility for leadership in this field.

So long have the American people taken for granted this Nation's position of world industrial leadership, and so heavily have they been propagandized with half truths designed to create an illusion of national security and prosperity, that now we face the very real danger of being unable to awaken our people to an awareness of the dangerous circumstances we face.

And, unless we can appraise our position and realine our economic forces in a pattern more appropriate to domestic need and to world

conditions, both our actual situation, and our relative economic position in the world will most certainly deteriorate, and there will follow a consequent loss of economic prosperity and international respect and influence.

There is probably not one reasonable person in the entire nation who does not wish to avoid a shooting war at almost any cost consistent with the preservation of national integrity. And similarly, there are few reasnable persons who would deny that we are already negaged in a competitive endeavor to preserve or bargaining position at the tables of international diplomacy, and to demonstrate to the world that our economic system of competitive free enterprise is the one most capable of creating a living standard of abundance for the peoples who choose to follow it.

And the task of demonstrating the productive superiority of the American economic system is rendered many times more difficult because of the crushing load of military preparedness which is superimposed upon demands for consumer goods. We must provide ourselves and our allies with sufficient military power to deter any prospective aggressor, and, at the same time, provide ourselves and our allies with a consumer-living standard so abundant as to induce in the other free peoples of the world a conclusive belief that the American way is the best way.

We, therefore, have no choice between butter or guns. Our survival demands an economy of butter and guns—an economy of butter and guns for ourselves and butter and guns for our allies.

Senator O'MAHONEY. May I interrupt, Mr. Ellis, to ask you whether this statement is to be interpreted as meaning that it is the obligation of this Government to supply our allies and all other nations whom we embrace in the general term of free governments their butter and their guns?

Mr. ELLIS. No. It is my intent to say that we must lead the way. We must, by example, point the way to the full development of our natural resources and particularly our renewable resources, to the end that we have a full economy, and can help them do the same within their countries to the end that they have a full and abundant economy which is possible, in my opinion, only with an abundance of electricity at low cost, among other things.

Senator O'MAHONEY. And when you talk of free economy, I assume you mean an economy which is really free, that is to say, it is free from control, both by Government and by monopoly?

Mr. ELLIS. Right, sir. The is very true.

Probably at no time in history, including the period of World War II, has so heavy a burden been placed upon the production and distribution system of any single free nation.

For in undertaking this simultaneous contest of military preparedness and consumer productivity we are competing with a nation far superior to us in terms of total population, a nation possessing an enormously larger standing army, and a nation which exerts absolute political control over the utilization of its productive resources.

Our competitor can do things at maximum efficiency which Senator Ellender so ably pointed out here yesterday, including the development of the hydroelectric resources.

Nor can we longer relax in the warm reassurance of technological superiority, for the competency of Soviet technology has been clearly demonstrated by recent events, and ably reported to this subcommittee by Senator Ellender.

It is, furthermore, not immediately clear that even our best efforts can assure us of successfully emerging from this struggle for economic supremacy. For, although it would seem that a national economy sufficiently healthy and productive to sustain the parallel burdens of affording military preparedness and a high living standard to the free world should exhibit all the symptoms of continuous growth, for we are, even now, faltering in the throes of an economic depression, recession, backslide, or whatever one chooses to call it.

Factories are closing, and unemployment is predicted to hit the highest level since 1950 this month. Automobile production is down, steel production is at about 54 percent of capacity, railroad carloadings are below last year's levels, aluminum production is reduced and small-business failures are at the highest level since 1940.

Farmers are going broke by the thousands and moving to town, I might say.

These facts are not indicative of the type of economy with which we can expect to outmaneuver the Soviet Union in the contest for economic and ideological domination of the world.

The productive effort of a nation can be no better than its availability and utilization of resources, and to achieve our maximum productive effort we must achieve optimum employment of our human resources and maximum development of our natural resources—and particularly of our renewable natural resources.

The rural electric systems have, of course, supported Federal river basin development because to a large percentage of them it has meant the first adequate source of low cost wholesale energy supply. That is just as true in Chairman O'Mahoney's State as any other State. At the present time, 450, or nearly half of all the rural electric systems throughout the United States depend upon the Federal multipurpose dams for all or a portion of their wholesale power supply.

As you know, the electric power industry is probably the fastest-growing major industry in the United States—doubling its sales every 7½ to 10 years, come war or peace. And the rural segment of the industry is doubling even faster—every 4 to 5 years. Where the capacity and the energy are to come from to double again even in the immediate future is uncertain. The very thought staggers the imagination.

Senator O'MAHONEY. To what do you attribute the very rapid development of the rural segment, which you say here is doubling even faster than other segments, every 4 to 5 years, when, at the same time, we must acknowledge the farm problem and the movement of farm population from small farms into the cities?

Mr. ELLIS. Senator, we have devoted a great deal of study to this, and to us it is now clear, after a year of intense study of the problem, with the help of the Department of Agriculture, the Census Department, and other experts.

Senator O'MAHONEY. If the farm population is declining, if the problem of agriculture is getting more insoluble, so to speak, what is the reason for the rapid increase of which you speak of rural electrification?

Mr. ELLIS. I will tell you. In the first place, the whole American economy is still in the process of catching up. It is still in the process of using, to optimum efficiency, electricity to replace manpower, and electricity to do many things that manpower can't do. When I speak of manpower, I mean all other kinds of power, too, animal power, all animal power. Electricity is, as you know, the most versatile of all the forms of energy. It can be used for just about anything that any energy can be used for. So the whole economy is still streamlining itself, is still in the process of mass production techniques, development, using more and more electricity all the time. That is why the whole economy is doubling its use of electricity every 7½ to 10 years. The rural areas were a half century late getting started. So they are going to be still longer catching up. Furthermore, as you know, the average farmer spends roughly half of his time other than in the fields. It is in performing the other half—in the farm home and in the barn—where he can most advantageously use electricity. As you pointed out a long time ago in a paper which you wrote and which I read, the day would come when electricity would be used by the farmers to pump their water, to heat the water, and to have all of those conveniences in the rural home which city people have in the city home.

That process is still going on. Despite the fact of considerable unemployment, manpower is very costly. So the farmers are replacing manpower with electricity.

Senator O'MAHONEY. Will you put into the record, at your convenience, the statistics that you have found with respect to the expansion of the use of electricity in rural areas, and also the facts you have found with respect to the elimination of the small farmer?

Mr. ELLIS. I will, sir, and along with that I will point out that despite the declining farm population in rural America, the total population in rural America is not decreasing.

Senator O'MAHONEY. All right. Put that into the record.

Mr. ELLIS. Yes, sir.

(The tables and documents submitted by Mr. Ellis appear in the appendix, beginning on p. 187.)

Mr. ELLIS. We of the rural electrics generate only about 15 percent of the energy we sell to our consumer-owners. We buy about 41 percent of our requirements from the commercial companies, about 34 percent from the Federal Government. We are in trouble on our wholesale power requirements—in many areas right now.

But, in the larger sense, our position in this matter has been and is based upon the broader principle that the survival, soundness, and growth of the rural electrification program depends upon a prospering agriculture and prosperous rural America and upon a vigorously growing national economy.

At the present time, we are fearful—fearful for the future of ourselves and we are fearful for the economic future of our Nation. For, although the philosophy of "What is good for General Motors is good for America" stands disproven by the downward trend of our economy, it seems to me, the administration clings to it—clutching at straws—and chanting the old familiar chorus: "Prosperity is just around the corner."

We have now experienced 5 years of Government policy admittedly oriented toward business—a big business utopia.

What do the figures show? Since 1950 farm foreclosures have risen from 1.4 per thousand farms a year to 2 per thousand farms a year. That is a very substantial increase. Small-business failures in the Nation have increased from 7,626 in 1951 to 12,547 in 1957. Yet, during this same period, between 1951 and 1957, the index of prices paid by farmers has risen from 256 to 299 and the net farm income has dropped from $14.8 billion to $11.9 billion. And, significantly, the true direction of the administration's economic policies are clearly indicated by the fact that, during the past several years, while farm income has been going down, while retail price levels and the level of prices paid by farmers have been going up, and while small-business failures have been going up, net interest income—income to the holders of corporate securities—has increased from $5.9 billion in 1950 to $12.9 billion in 1957.

It is difficult to ascribe motivation or intent to any group which controls the Federal Government, but the results of the policies adopted by such a group become clear from their impact on the economy. The only valid indication of the intent of a man or of a political party, or an administration in power, is the result produced.

And, while the small independent businessman, the farmer, the rural electric cooperatives and rural power districts, and the Federal water resource development program have all been squeezed during 5 years of Eisenhower policy, the large corporations have prospered and grown even larger through absorption and merger, and because of their monopoly positions. The big business orientation of Eisenhower economic policy is, in my opinion, the single underlying cause for the abandonment by the Federal Government of its traditional role of leadership in resource development.

We like to believe that our long association with various Federal water and power policies and programs qualifies us, to a limited extent at least, to determine their purpose and appraise their results in terms of their capacity to serve the public interest.

It is our opinion that the Eisenhower policy toward water resource development is a policy designed to prevent expansion of Federal participation in the reimbursible features of multiple-purpose projects and to open up our water resources for wasteful exploitation by privately owned public utility companies.

Such a policy can achieve no contribution to the productive economy we seek, and can only serve to destroy a large portion of our country's productive capacity—its potential.

For this is an administration which has expressly stated that wherever possible multipurpose water resource development will be left to "local" groups—usually meaning "Wall Street" controlled groups operating locally—and that the Federal Government will undertake responsibility only where particular circumstances preclude the financial capacity of "local" groups to undertake such development.

And, pursuant to this overall policy, the executive branch has adopted administrative procedures designed to deliver our water resource development program to the control of privately owned public utility companies, and insofar as possible, to prevent remedial interference by Congress with this policy.

Thus we have seen the Bureau of the Budget and the Department of the Interior and Corps of United States Army Engineers impose

such restrictive project justification and cost allocation criteria as to immediately deteriorate the apparent desirability of many river basin development projects, destroy the apparent justification of many others, and create an ostensible but unjustified need to increase the wholesale rates charged to those who purchase the federal power.

There has been the much talked of concept of "partnership," a term the definition of which seems sufficiently elastic to cover any waterpower development for a profit—power company profit only—or any development not undertaken by the United States. "Partnership" is the name of a policy by which the Government undertakes construction of the nonreimbursible features of multipurpose projects while allowing the private profit power companies to install the more remunerative revenue producing hydroelectric features; that is, the cash registers. It is true that the "partnership" principle is ostensibly broad enough to include participation in river basin development by any genuinely local entity, but in fact, the major privately owner utility companies are usually the only "local groups" which possess sufficient financial resources to participate in the program.

A secondary effect of the relinquishment to these so called "local interests" of previously held Federal responsibility for leadership in water resource development has been the destruction of carefully developed plans for efficient regional integration of water resource utilization.

Thus, as applied to the Pacific Northwest, for instance, the comprehensive plans for the development of the Columbia River Basin system and neighboring river basin systems into an integrated regional resource gather dust while "partnership" proposals become the subject of endless academic discussion.

As a consequence, the electric power supply of the Northwest has fallen below the level necessary to maintain the commercial and industrial growth of the area.

In the Tennessee Valley area, notwithstanding Eisenhower campaign promises to the contrary, we have seen during the past 5 years the so-called Dixon-Yates scandal by which the President and his advisers attempted to subvert the purpose of the Tennessee Valley Authority by obliging it to accept the invasion of relatively high-cost power from a privately financed holding company plant to be built in a swamp on the west side of the Mississippi River.

Senator O'MAHONEY. I think I ought to interrupt there, Mr. Ellis, to say that I think, since I was a member of the Antitrust Monopoly Subcommittee of the Senate Judiciary Committee, which conducted hearings on the so-called Dixon-Yates plan, I was convinced by the evidence there, that the President actually was not fully advised as to the details of that proposal, and, consequently, when, as a result of the hearings, the facts were revealed, the President himself canceled the contract.

Mr. ELLIS. Thank you, Senator.

In addition, the President has now had the opportunity to replace by appointment all three members of the TVA Board of Directors. For two of these appointments he has chosen men whose philosophy of Government and of the electric-power business is diametrically opposed to the progressive policies of comprehensive multipurpose river basin development stated in the TVA Act and for which TVA is a world-famous symbol.

And although the Eisenhower administration has consistently refused to ask Congress for appropriations needed to finance TVA capital expansion, and while it gives lipservice to a TVA bond-financing program, yet when the chips are down, we get little or no administration support for the passage through Congress of TVA bond-financing legislation of any sort, and the most violent opposition to the kind of bond-financing legislation, that would be effective in preserving the integrity of the TVA system. Fifty-one rural electric systems in the six-State Tennessee Valley area are dependent on TVA as their source of wholesale supply.

In the Southwest, the application of Eisenhower resource development policy has been made on a cockeyed, inequitable, arbitrary mathematical basis. Project justification ratios, cost allocation formulas, repayment schedules, and estimates of the quantity of Federal power available and how it will be sold have been analyzed, evaluated, reevaluated, and reanalyzed to the extent that no one knows which project, if any, should be built next, how much it will cost, where the power will be sold, or how much should be paid for it, or how the cost allocations will be applied. We do know, as to existing projects, that Federal power rates have recently been increased 27 percent to the rural electric cooperatives in a several-State area which has also been progressively hit in recent years by drought, flood, and economic distress.

As a result now, many of those cooperatives are having to raise their retail rates to their members.

Senator O'MAHONEY. Do you have copies of the order?

Mr. ELLIS. We can get it.

Senator O'MAHONEY. That is, pertaining to this item.

Mr. ELLIS. Yes, sir.

Senator O'MAHONEY. If you can document that statement, I would like to have it.

Mr. ELLIS. Yes, sir. We will do that.

(The order referred to appears in the appendix on p. 191.)

Mr. ELLIS. In the Missouri Basin States, President Eisenhower's appropriation requests for multiple-purpose project construction by the Corps of Engineers are insufficient to maintain expeditious construction schedules, and cause delay in the installation of badly needed hydroelectric generating capacity.

Furthermore, the inadequate Federal transmission system in the Missouri Basin States makes it impossible to deliver Federal power where it is most needed and prevents the efficient integration of existing Federal hydroelectric stations—and the administration steadfastly refused to do anything about it.

The administration since it took office in 1953, has, to my knowledge, not recommended construction of a single new multipurpose project by the Corps of Engineers.

It has, in fact, by administrative action, and in defiance of the expressed will of Congress, delayed construction on some of the projects for which initial funds have been appropriated by the Congress in the face of opposition by the President's Budget Bureau.

I speak, of course, of a Federal resource development program largely in terms of electric power since electric power is the lifeblood of the rural electrification program which I represent and in a larger sense is the lifeblood of a nation.

For electricity is the most flexible and most easily applied form of energy through mechanical processes. And a nation's productivity and ability to maintain its position in the world is closely correlated to its production and consumption of electric power.

Without a dynamic Federal wholesale power program based on multipurpose river-basin development, vast areas of the West are doomed and cannot be counted upon for their proportionate contribution to an economy upon which we are depending to maintain the American way of life. Water for irrigation and municipal and industrial use is the lifeblood of the West and of the Nation. But water storage for these purposes without simultaneous development of Federal hydroelectric power is usually financially impossible. No other type of project has ever worked and never can.

Two years ago, for example, the Congress authorized the Colorado River storage project, one of the few new Bureau of Reclamation developments recommended by the Eisenhower administration. It is a multipurpose program for developing the upper Colorado Basin with a sort of power company partnership arrangement for the power transmission—just the transmission part. That project and its participating projects will provide water for hundreds of thousands of acres of newly irrigated land and supplemental irrigation water for additional hundreds of thousands of acres. Eventually the project will have an installed electric generating capacity of about 1,300,000 kilowatts. Of the total project costs of some $1.52 billion, $713 million, or approximately 47 percent is allocated to hydroelectric power and will be repaid by the power users. An additional $691 million has been allocated to irrigation, and of this amount power users will repay $599 million, or 87 percent. In other words, power will repay into the United States Treasury the total power cost and 87 percent of the irrigation costs.

And the rural electric users of power will pay a good percentage of that.

The Missouri River Basin project is a $5.38 billion undertaking. $1.14 billion of its cost is allocated to power and will be completely repaid by the power users. $2.24 billion is allocated to irrigation. The power users will repay $1.85 billion, or 83 percent of the irrigation costs, also.

Yet these very multipurpose projects upon which the economy of the Nation depends are those for which the Eisenhower administration has in most cases affirmatively declined responsibility. And while the Soviet Union places the full force of its controlled economy behind an all-out effort to overtake the free world in the production of basic commodities, including electricity, and although our own economy must bear the unprecedented burden of matching Soviet achievement with substantially less manpower and infinitely less political control, the leadership necessary to keep our resource development program on schedule is nonexistent. And we are falling behind, as Senator Ellender has so ably demonstrated.

And now there is the additional burden of reversing a trend toward decreased economic activity. Call it a depression, call it a recession, call it whatever you want. Factories are closing, production is down, and all of the nations of free Europe fear economic distress unless the United States economy can stage a rapid recovery.

Despite all of these factors, each of which points to the need for a resumption of Federal leadership in water-resource development, we find the Eisenhower administration recommending to the Congress instead a budget for fiscal year 1959 which somewhat pridefully recites that no funds will be requested this year for new starts by the Bureau of Reclamation or the Corps of Engineers.

In view of the present Federal policy toward water resource development, it is perhaps not difficult to understand the program of the United States purportedly designed to achieve the economic application of nuclear energy.

As I have previously pointed out, basic to the industrialization of, and basic to any attempt to raise the standard of living of, any area of the world is an ample supply of low-cost electric energy. For it is everywhere recognized that there is a close correlation between the standard of living of a country and its supply of low-cost electric energy. One of the great hopes of the growth areas of the world is that, within the near future, technological progress regarding the peaceful uses of atomic energy for the generation of electric power will have been developed to such an extent that electric energy production will no longer be considered in terms of a scarcity item but rather in terms of a prime economic factor so abundant that it has no money value.

As has been emphasized in a recent United Nations publication, Economic Application of Atomic Energy:

> The possibilities for application of nuclear energy to the generation of electricity evoke a wide interest because of the great importance of electric power for economic development.
>
> With the rapidly growing need for power, both in highly developed and less developed areas, the emergence of a new and potentially large source of energy to supplement the older sources is of great significance.

Our previously assumed world leadership and technological advancement had been seriously challenged in this field of atomic energy. And perhaps one of the main reasons explaining the fact that our technological superiority in this area has been challenged is that there are those in high Government councils who would do anything in their power, apparently, to assure that the peacetime application of atomic energy which up to now has been financed almost exclusively by the Federal Government—that is, by all the people—should be turned over exclusively, lock, stock and barrel to private profit interests.

It has been argued by some that we have not made greater advances in this field because there has arisen a conflict between those who want public wholesale development of atomic energy technology—at least some substantial percentage—and those who want exclusive private development of this technology. Perhaps there is some validity to this statement. And it would appear on examination that there is much in favor of continued public development, for astronomical quantities of Federal funds have been used already to bring us this far.

In addition it appears quite evident that commercial power companies and the manufacturers of atomic-reactor materials are currently either not prepared or do not have proper economic incentive to engage in endeavors and research in this vital area.

In my opinion, Mr. Chairman, one of the most effective foreign policy speeches ever delivered by the President of the United States was made in December of 1953.

At that time, President Eisenhower presented what he thought and I agree to be a solution of the "fearful atomic dilemma." The President pledged that this country would devote its entire heart and mind to find a way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life.

This speech by the President I feel sure had a tremendous effect upon the peoples of the world. But this Nation has not lived up to the President's pledge of December 1953. And to the degree that we have not lived up to this pledge, by that degree we have lost face with the citizenry of the world.

As Mr. Eugene M. Zuckert, former member of the Atomic Energy Commission, said recently in a speech—

> frankly, we have disappointed the world and our own hopes; either the job we took on was too tough and we promised too much, or we have not done as well as we should.

Compared to our theoretical potential in the area of developing atomic energy technology, our application of this technology has been a dismal accomplishment. We do have some small degree of belated success in developing atomic reactors such as the Shippingport plant. And in addition there are some small experimental reactors producing noncommercial quantities of atomic power toys. Estimates also have it that, by 1965, we can expect to have some 3 or 4 million kilowatts of nuclear power in the United States. Compare this to the progress England has made. Compare this to the progress that has been made by Russia. As Mr. Zuckert pointed out in his talk "we can only hope that we will not learn of Russian intentions to place a power reactor in some country more neutral than its satellites, because this would certainly be another outstanding propaganda victory for Russian science and technology."

The argument that we need not develop atomic reactors in this country because we have an abundance of low-cost power has been exploded many times. It is like saying we never needed automobiles because we had the best railway system on earth.

But for the sake of the record let me state again that we must take into account the feelings, wishes, desires and aspirations of our allies and prospective allies in the world as regards this top energy program. It, therefore, is virtually mandatory on our part to proceed at a much accelerated pace in developing this technology. Indeed this argument has been exploded by the Eisenhower administration itself when it said that it would be tragic if it were not the United States which provided or supplied atomic energy to the underdeveloped nations of the world.

Already England is moving ahead of us in this field, if not Russia. Again to quote from Mr. Zuckert, he stated that—

> the difficulty is that the United States program is only partially concerned with results and technical superiority; of equal and sometimes overwhelming importance, the program has been determined by certain ideological and economic considerations. These have not only affected the technical pace of atomic energy; they have distorted the perspective of those in charge of the program and invalidated their objectivity.

The administrative officers of the Federal Government face a formidable dilemma. Back in 1952 and 1953 the propaganda machines of the profit power companies and private industry operated overtime

to prove to the Government and to the American people that progress in the atomic energy field could not take place unless the so-called Government monopoly on atomic energy were broken. We argued then that the power companies would never do the job. The so-called Government monopoly was broken, in that private industry was given the nod, but the program failed.

The so-called Government monopoly was broken with passage of the Atomic Energy Act of 1954. But now private industry finds that atomic energy technology is clearly too little advanced. Private industry cannot or will not foot the bill and proceed. It finds that solutions to major problems are far too expensive to achieve without much more Government participation than the opponents of the Government program wanted or at first believed necessary.

Now the very same industrial and profit utility firms which fought our efforts for a real Government-sponsored atomic energy program are clamoring for more Government participation. I trust that is common knowledge. If not, I will be glad to submit for the record as one evidence, for whatever evidence it is, a page from a recent issue of Time magazine, in which this is, I think, very clearly and fully stated, the fact that American industry now realizes that the Government must move ahead.

Senator O'MAHONEY. You may submit the material.

Mr. ELLIS. Thank you.

(The article entitled "Atomic Power—Industry Asks More Government Help To Speed Program," appears in the appendix on p. 196.)

Mr. ELLIS. The very companies which in effect ridiculed NRECA for referring to AEC as the Atomic Energyless Commission are now in effect not only agreeing with us but are saying in effect that the Atomic "Energyless" Commission is virtually "Chairmanless," because there is no leadership. But the selling job and the propaganda job and the whitewash job done on the administration has been, so far, too great to overcome.

Or perhaps I am being a little unfair, for it may well be that those who govern the destinies of our atomic energy program did not need any propagandizing. For, the beliefs that they now hold, they may well have held before taking office. They may, as a matter of fact, have been chosen primarily because of their prejudice in favor of turning over the potentially unlimited atomic energy program to private enterprise without governmental yardsticks or safeguards.

Now the American manufacturers of atomic machinery are at odds with the profit power companies for the manufacturers have come to realize that they are losing out in the international market because they do not have either the funds, the trained personnel or the technological know-how with which to compete with other nations for the international market. We are in a word, Mr. Chairman, second grade at best as far as our reactor technology is concerned.

There is no doubt that many technical problems still remain unsolved, but the basic facts are that we must build power reactors in this country of a size geared to use not only here at home but also geared for the foreign market. We must not assume that the people of foreign nations are stupid. We must not expect foreign countries to follow United States atomic energy leadership, assuming there is any, in the power reactor field if we do not experiment, if we do not build and rebuild and gain experience in the use of atomic energy reactors.

The criterion we must set for ourselves is not the economic feasibility of reactors that we presently build, but rather what their promise is for the future.

The atomic energy program of the United States is of a nature which precludes basic or extensive participation by private enterprise. This is a job which can only be done in the main by the Federal Government.

This challenge, this challenge of development of an atomic energy program for consumption at home and abroad, is a challenge which will truly test the flexibility of our democratic free enterprise society. And, if we lose, not only will serious doubt be cast upon our form of economic system, but serious doubt will also be cast upon our form of government, for surely, if we lose out in this program, the charge will follow that we allow our Government to be run by special interest groups—and it has already been heard—who do not hold the wishes and the needs of the people uppermost in mind, but who are interested only in their own special interest problems and salvation. If we lose, the implications will be even worse than those contained in the story of what happened when the orbits of Sputnik II and our Explorer first crossed a few nights ago.

Explorer is supposed to have said to Sputnik II, "Now, that I finally got out here with you, let's both of us talk German to each other."

It is indeed difficult to understand the Eisenhower approach to resource development in view of the technological problems with which we are faced in the nuclear energy field, in view of the unprecedented burden of productivity which has been cast upon our conventional energy resources, and in view of the need to reverse a dangerous downward economic trend.

If we just stop to think for a second where we are going to get the fuel, to double our electric energy again in 7 or 8 years, and to double again beyond that, and to keep on doubling every 7 to 10 years, as apparently we must do, then we come to realize the tremendous importance of nuclear fuel in the future.

The need for Federal leadership in resource development was never greater; I am convinced that, if our Nation is to survive and emerge from this idealistic and economic conflict with its integrity and sovereignty intact, we cannot longer postpone the development of our water resources on a truly comprehensive multipurpose basis.

Though limited they are, they must be developed to the full. We cannot longer postpone resuming multipurpose development and conservation of our water resources, and we cannot longer postpone a crash program to achieve a major breakthrough toward economic nuclear energy.

It is clear that none of the leadership necessary to such a resource program can be expected from the Eisenhower administration. Certainly it will not come from those now in charge of the various agencies.

The American people must look to the Congress for a program to provide the kind of economy necessary to our survival. This is the basis of my appeal to you.

In my opinion the greatest single service that could be rendered the American public by this subcommittee would be for it to do whatever is necessary to create a nationwide awareness of the abject

failure of the present administration to provide for the resource development needs of the Nation.

The Eisenhower big business policies must be ditched. And there must be substituted for them the aggressive Federal leadership which is so obviously needed if our economy is to be put back on the track.

This is your role as I see it. May God help you—and God help us all if you don't do it.

Senator O'MAHONEY. Senator Murray, have you any questions?

The CHAIRMAN. No. I am very glad to be here, though, to hear this excellent statement. I wish to commend the witness for the very fine study he has made of this problem.

Senator O'MAHONEY. Senator Kerr, we welcome you as the representative of the Public Works Committee to our session.

Have you any questions?

Senator KERR. Thank you, Mr. Chairman. I have no questions. I just want to say that I think it is a very, very good thing for our country that there is a vigorous, able, vocal representative of the rural electric cooperatives of our country, so alert and diligent in the presentation and dissemination of information relative to the needs of our entire economy in the matter of resource development, and in the specific application of the benefits of it to the farm population of our country.

Senator O'MAHONEY. Thank you, Senator.

Senator Barrett.

Senator BARRETT. Mr. Chairman, I have a couple of questions.

Mr. Ellis, on page 2 of your statement, you state on the bottom of the page that we have no choice except to supply an economy of butter and guns to ourselves—with which I agree—and I wonder what you mean by butter and guns for our allies. Are we obligated to supply butter and guns for our allies according to your terms?

Mr. ELLIS. No, sir, I did not mean that, Senator Barrett. Senator OMahoney asked me before you came in practically the same question.

Senator BARRETT. I see.

Mr. ELLIS. What I mean to say is that we must lead the way in full resource development, particularly of our renewal resources, first for ourselves and then to help others do the same, for thus can we both have the fuller economy and the more abundant. To do less than that is to forget the leadership which we have so long had in the world and turn it over to the Russians, who are carrying out, as explained so ably yesterday by Senator Ellender to us what must be the most tremendous multipurpose river development program ever undertaken anywhere on earth, and which will give them, no doubt, tremendous quantities of electricity at substantially lower prices than we are going to be able to produce for in like amounts in the United States.

Senator BARRETT. There is one other question or two I would like to ask you. On page 15 you refer to profit power companies, and on page 17 you refer to profit power companies. I notice sitting across the table from me a gentleman here who has been a master in the free-enterprise system in this country, and who has done very well with it.

What I would like to know from you is this: Is there something wrong with our American system of free enterprise, for which you proceed to castigate it in that fashion?

Mr. ELLIS. No, sir. It is not wrong in that it is free enterprise, where it is free enterprise. However, the profit power companies are not a part of the free-enterprise system.

The Congress, the State legislatures, and the courts, as you know, have long held that to be the case. They are, rather, public utilities. All utilities are, in a sense, public.

I use the term "profit" to distinguish them from the rest of the power industry, because they are operated for profit, whereas the municipal electric systems and the electric cooperatives and the power districts are operated by the consumer-owners for service.

I am a great believer in the profit system. We must sustain it. The only way it will survive, in my opinion, is for us to have checks on monopoly. The profit power companies are, by their nature, monopolies, and there must be yardsticks, I think, and there must be competition by example to keep them in check.

Senator BARRETT. Mr. Ellis, I never guessed that you were saying any kind words for the free-enterprise system from your remarks. Let me ask you this question:

On page 4 I note that you state that the rural electrics buy 41 percent of their requirements from commercial power companies and 31 percent from the Federal Government.

I think somewhere else in your statement you said that the field of hydroelectric development is extremely restricted. Consequently, I would assume that you mean to say, then, on the whole, that we must depend largely on steampower to meet even the requirements of the REA's?

Mr. ELLIS. Yes, sir. I would say that whereas about 450 of the rural electric co-ops, including most of those in the Senator's State of Wyoming, depend upon the Federal power program for their wholesale supply, there are nearly half of them that depend upon the commercial companies, and a large percent of what they buy from the commercial companies is produced by steam.

Also, about 15 percent of the power which the rural electric systems use is produced by themselves. A high percent of that which they produce themselves is produced from steam. I do not think, however, that that diminishes the very great importance of Federal wholesale multipurpose power developments wherever they are possible, because in much of the West, for instance, the rural electric systems were not themselves possible until we first had Federal wholesale power development from which we could get the source of energy.

Senator BARRETT. Our hydroelectric installations, potential installations, in Wyoming are practically nil at the present time and, consequently, we are now embarking on a program whereby the profit power companies are going to build large steamplants and generate power that we need so badly out there, and a great deal of which is supplied to REA's.

The next question I wanted to ask you is this: On page 13 you refer to the atomic-power plants and, on the next page, I believe, to the Shippingport plant in Pennsylvania.

Again I want to call your attention to the statement you made on page 18, which was not in your prepared statement, in which you referred to the fact that the demands for power were doubling every 10 years, I think you said, and used that as an argument that we should go ahead with the atomic power.

While I agree with you that we should go ahead with the atomic power, I want to ask you this question: We have unlimited supplies of coal in this country. In the Monntain States we have a practically unknown and unlimited supply of shale oil, and we have gas an oil in this country in considerable quantities. The Shippingport plant out there produces power at 13 times the cost of power produced from coal.

Is there any reason that you know of why we should not rely on our coal resources, we will say, or our oil and gas resources, and if we need additional resources, our shale-oil resources, to produce this power that we will need in our economy in increasingly larger amounts every 10 years?

Mr. ELLIS. Yes, Senator, I think there is a tremendous and overwhelming reason why we should not rely upon the coal and fossil fuel resources for energy requirements.

In the first place, all of the predictions of the power companies, Federal Power Commission, and others who have made studies, indicate that our population is going to grow very fast; that we are going to continue to use, relatively, much more energy; and that the feasible coal resources of this country, in many parts of the country, would be, for many years, becoming scarcer and scarcer.

Even now in many sections it is costing more to mine the coal because it is further back. The better veins are being worked. Unless we can begin to supplement our rapidly diminishing river-development program—there isn't a lot more that is as economical as what has been developed—and supplement our coal-energy supply, and gas- and oil-energy supply, then we are going to be in trouble.

Senator BARRETT. Let me give you some figures about Wyoming. I think you are entirely mistaken about it as far the Mountain States are concerned. I am not prepared to argue about the Eastern States of the country.

As far as the Mountain States are concerned, I think you are entirely mistaken about your assumption there. The Pacific Power & Light Co. put in a plant at Glenrock, Wyo., that will produce 100,000 kilowatts, which is nearly as much as all the hydroelectric power that is available in Wyoming at the present time.

The Utah Power & Light Co. announced a few days ago that it was installing a 150,000 kilowatt plant near Kemmerer, Wyo., and in both cases they will use coal. They estimate that the supply of coal available for those 2 plants will be enough to carry them on for well over 100 years.

That is just a drop in the bucket as far as the coal in Wyoming is concerned. I certainly do not agree with you that there is any danger in the foreseeable future that we are going to run out of coal, which could be converted into power and sold in that fashion, not only in Wyoming but all over the West, and in the Pacific coast area, too, for that matter.

It seems to me that inasmuch as you can produce power from coal at about one-thirteenth the cost as you can from atomic energy, that there is no reason why we should say we will forget that resource, or forget oil and gas, or forget shale oil, if we have to.

Mr. ELLIS. If I may, Senator, I would like to reply to two parts of your statement. In the first place, I would say that if the economy

of Wyoming parallels the anticipated growth forecasts of the American economy, these 100,000-kilowatt plants which are being built out there will not be the 10th part, either, of what you will need in new plants. You will have to keep on needing new plants.

Senator BARRETT. If you will yield a moment, I indicated to you that the coal needed for those two plants is just a drop in the bucket compared to the coal available in Wyoming. You know that.

Mr. ELLIS. I concede that in that area you have tremendous quantities of coal available. But I also know some of the difficulties of getting that coal out, and getting it to generating plants, or, because of your tremendous distances in the West, transporting the power. We have had great difficulty in Colorado, where they also have tremendous quantities of coal. Our own cooperative generating and transmission systems have had these problems. We have had to study the same problem in what we call our Tristate GT, which is composed of cooperatives in southeastern Wyoming, northeastern Colorado, and northwestern Nebraska, and which has had a loan made to it in the last 2 years.

This GT is now postponing construction because we have been assured of some additional power from the Bureau of Reclamation which will cost us less than we could generate it for.

Senator BARRETT. I do not think there is much to your point. Otherwise, these companies who must depend upon the free-enterprise system for their money to assume these risks would not be spending $50 million or $60 million in one case and $20 million or $25 million in another case, unless they were pretty sure that they were going to be able to make the profit that you mentioned a bit ago.

Mr. ELLIS. I am sure they will. And I am sure that they will continue to build steam plants for some years to come. My point is not that we ought to begin now replacing old plants, even, much less the new ones; that is, the fuel-steam plants with atomic-fueled plants. I am just saying that in my opinion, from our studies, it is here.

Great Britain is already developing quite a number of new plants, atomic plants, based on their experience at the Calderhall plant, and believe that it is competitive now, or at least they say it is, with the coal-produced electricity in England.

Of course, we recognize that their coal is running out. They are mining it from way out under the sea, as even our neighbors in Canada are doing already.

Senator BARRETT. You compare England with our country. But, as a matter of fact, we are not running out of coal in this country. As I have indicated here, the cost of producing power at Shippingport is, from atomic energy, 13 times the cost of producing power from coal.

I can see no good reason why we should abandon coal and put all of our eggs in the basket of atomic power in this country. That is for certain.

Mr. ELLIS. Senator, the Shippingport plant was the first. The first automobile cost a lot more than the second.

The day has to come when the reactors can be put, by some method, into larger scale production, just as the generators are in large-scale production in General Electric, Westinghouse, Allis-Chalmers, and other companies now.

The Shippingport plant is an experimental job. Nobody knows whether the process being used there is the best. In fact, there is great belief that it is not, including the atomic-energy experts who have so testified, who have so stated. There are many processes that are known.

My point is that we have to move in these fields, and we have to develop whatever is the best technique. We have to know. This is what we are not doing. Other countries in the world are going ahead of us.

Senator BARRETT. My chief argument with you, Mr. Ellis, is that it seems to me that the whole tenor of your approach is to displace the coal industry in this country and perhaps even the oil and gas industry, and in its stead spend all this money to develop power from atomic energy.

Mr. ELLIS. No, Senator, I don't believe that.

But if I did believe it, then I would believe atomic energy were going to be cheaper pretty soon that coal. I don't even believe that. I just believe that we have to move in this field.

Senator O'MAHONEY. And may I say, Mr. Ellis, I think there is more agreement than disagreement between you and my colleague. When you opened your paper this morning, you announced your support for the development of natural resources; did you not?

Mr. ELLIS. Right.

Senator O'MAHONEY. You are, of course, very much interested in developing hydroelectric power. But do you wish to testify to this committee, or to give the impression, that you believe that waterpower can now be used to displace the utilization of coal, of oil, of natural gas, or shale, and the rest of the natural resources?

Mr. ELLIS. No, sir. I think waterpower is still our cheapest, and I think it should be developed. I think coal is the next cheapest. I do not propose to diminish at all the use of coal. I think that some day we either have to develop the atomic potential, or other nations are going to do it, and they are going to outrun us in the world, and we will be left behind a second-rate nation. I think the process is already afoot.

Senator O'MAHONEY. Are there any other questions?

Senator BARRETT. I have one question, Mr. Chairman.

On page 6 you say that the REA's, the Bureau of Reclamation, and the Army engineers have been squeezed out during the 5 years of the Eisenhower policy.

Do you want to leave the impression, Mr. Ellis, that appropriations during the Eisenhower administration have been less, and all of these different agencies have been squeezed out during the past 5 years, than they were heretofore, or not?

Mr. ELLIS. Let me read the statement again, if I may.

Senator BARRETT. I am asking you a question of what you mean by your statement.

Mr. ELLIS. All right.

Senator BARRETT. I am asking you if you mean to say that appropriations for REA have been nonexistent, and that they have been squeezed down to practically nothing, and that the same is true of the Bureau of Reclamation, and that the same is true of the Army engineers in the past 5 years.

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Mr. ELLIS. Senator, I believe you read words into the statement which I did not put there. I did not say they had been squeezed out. I did not say they had been squeezed down, although I will accept that.

Senator KERR. Where is the statement?

Mr. ELLIS. On the top of page 6.

I said they had been squeezed, and I mean squeezed, during the 5 years of Eisenhower policy.

I will be glad, Mr. Chairman, to submit to the committee, for the record, the figures showing the extent to which the Federal wholesale resource development program has been reduced in terms of both new projects authorized, and in terms of appropriations for them.

Senator BARRETT. Can you give them to us now, so I can question you about them?

Mr. ELLIS. I cannot give them to you now, because I do not have them.

Senator BARRETT. Mr. Chairman, I am sure the records will disclose that that is not true at all, that these appropriations for the past 5 years have been growing every year, and that they are higher than in the preceding 5 years. I would like to have a chance to see what figures he wants to submit. I want to get the true facts before this committee.

I am sure this statement is not true.

Mr. ELLIS. Mr. Chairman, I insist my statement is correct, if we are talking about the same thing. I will bring the figures and come back and be glad to do it.

Senator BARRETT. When can you have them back?

Mr. ELLIS. I can be back this afternoon with them.

Senator KERR. Is it not a fact that in the budget message sent by President Eisenhower to the Congress this last month there was a statement in it that no new starts in the development of water resources would be made in the next 3 years?

Senator BARRETT. I don't know about the next 3 years.

Senator KERR. If the Chief of Engineers is here, I wonder if he would know if that was in the budget message or not.

Senator BARRETT. That is beside the question anyway. He is talking about the last 5 years. The Congress has not acted on that budget message.

Senator KERR. He was talking about the administration.

Senator BARRETT. He is talking about the last 5 years.

Senator KERR. I have another question to ask you.

Senator BARRETT. If you will read the statement there, he is talking about during the 5 years of the Eisenhower policy.

Senator KERR. I was going to get to that statement. My recollection is that in the budget message this last month was the recommendation that there be no new starts in water development in this country in the next 3 years, and I think most similar recommendations have been made in the budget messages in the last 5 years, and most of the new starts that have been made, have been made by the Congress over the President's recommendations.

Senator BARRETT. I would like to say this to my friend from Oklahoma, that the only reason that we were able to get through the upper Colorado River project, which is, of course, the biggest ever au-

thorized and placed under construction in the history of this country, was because of the active support of President Eisenhower.

Senator KERR. And a majority of the Democrats in the Congress.

Senator BARRETT. President Eisenhower made the effort that was never made heretofore, and he is the one that is entitled to the credit for getting that project over. That certainly was a new start.

Senator KERR. Yes, it was. He is certainly entitled to a lot of credit. But also that credit should be shared by whoever in the Congress voted for it, regardless of the party.

Senator BARRETT. I would say that is true.

Senator KERR. Is the Senator aware of the fact that for many years we passed authorization bills here for flood control projects, and that one we passed 2 years ago was vetoed by the President? It was passed last year by the Senate, and it is now hung up in the House of Representatives because of the opposition of the President.

Senator BARRETT. I know there was opposition, and the President vetoed that flood control bill or act of 2 years ago. I was not in favor of it myself. But this much I can say, that he gave his reasons why he vetoed it, and an effort was made to correct the legislation the next time it came around. What has happened recently, as the Senator well knows, is occasioned by reason of the fact that we are obliged to spend billions on missiles. That is the reason why this program has been slowed up.

If the situation develops where the economy of the country demands the expenditure of large amounts of Federal funds to correct the unemployment situation, certainly the first place that the money will be spent will be on water projects.

Senator KERR. Doesn't the Senator feel that a veto of an authorization bill for water resource development, and opposition to it, where it will soon be 4 years since the Congress passed one, constitutes somewhat of a squeeze on the program?

Senator BARRETT. It depends upon the reasons given for the veto and the position taken by the Executive. Of course, they had plenty of authorizations on the books where funds could be used that were made available by the Congress, and that has been done. That is the point I have been making. I will say this, and Mr. Ellis will have the opportunity to correct me if I am wrong, that the appropriations for the Army engineers, and the appropriations for the Bureau of Reclamation, have not been squeezed, but, on the contrary, they have been rather generous for the past 5 years.

Senator KERR. Would the Senator put into the record the projects that this administration has recommended as new starts during its tenure of office?

Senator BARRETT. I told you that as far as the Bureau of Reclamation was concerned, that this administration authorized the upper Colorado River project.

Senator KERR. The Congress authorized it, Senator.

Senator BARRETT. The President had to approve it.

Senator KERR. He recommended it. He did not have to approve it, but the Congress authorized it.

Senator BARRETT. You could not get anywhere with the previous administration. You know that. The upper Colorado River project is one that this administration can take practically all the credit for.

Senator KERR. One swallow does not a summer make.

Senator BARRETT. But that is the biggest one ever authorized in the history of this country.

Senator KERR. I am for it, but I am aware of the fact that it is not within a thousand miles of Oklahoma.

Senator BARRETT. I am not from Oklahoma, as the Senator knows, but I am far beyond that. I will say that I agree on the position that the President took on rivers and harbors authorizations. I am saying that it is not all to the bad as this statement would indicate.

Senator KERR. I don't take the statement to mean that the witness feels that the administration has entirely eliminated the programs.

Senator BARRETT. Would the Senator yield to me?

Senator KERR. Yes.

Senator BARRETT. Would you admit that the appropriations for the Army engineers for the Bureau of Reclamation, and the appropriations for REA, have been as high if not higher during the past 5 years of the Eisenhower administration as they were in the 5 years previous?

Senator KERR. I do not know. I do not dispute it.

Senator BARRETT. I am sure that is right.

Senator KERR. But I do take issue with the statement that the Senator made. I do take issue with the statement the Senator made about necessity for expanded defense justifying cutting down either in the building operations or projects now under construction and a recommendation of no new starts. I am of the opinion that the Senator——

Senator BARRETT. Just a minute, if the Senator will permit me? You are putting words into my mouth. I did not say that. I said that was the reason that the Chief Executive gave. I did not say that I agreed with that.

Senator KERR. Then I will address my remarks to the attitude of the Chief Executive gave.

Senator BARRETT. That would be right.

Senator KERR. I will ask the Senator if he is aware of the fact that the recommended budget by the Chief Executive for fiscal 1959 for the Defense Department, if passed by the Congress as recommended, would procure less production and result in less employment than did the Defense budget in fiscal 1957.

Senator BARRETT. I am not prepared to answer that question.

Senator KERR. While the Senator from Oklahoma looks up the difference in appropriations in the last 5 years, with the preceding 5 years for natural resource development, would the Senator from Wyoming check the answer to the question of the Senator from Oklahoma?

Senator BARRETT. I do not know just whether I could check that or not. I assume you mean the expenditures for missiles are not going to give employment to so many people.

Senator KERR. No. I mean if we provide every dollar requested by the President in the Defense budget for fiscal 1959, my information is that the overall program will result in less employment and less production than was provided by the Defense budget in fiscal 1957.

Senator BARRETT. I am inclined to think that maybe that is true. But I don't know what we can do about it. That means that to manufacture these modern weapons will not give employment to as many people as the conventional weapons we have at the present time.

Senator KERR. That being the case, does the Senator feel that a program which thus compares unfavorably in some aspects with the

one in 1957 should be the basis for refusing to make any new starts in water-resource development?

Senator BARRETT. No; I think that we ought to make these new starts in water-resource development, consistent with a program that would keep this budget in balance if it is humanly possible, provided, of course, that unemployment is not such that we would have to disregard a balanced budget and proceed to do those things that would bring about employment.

Senator O'MAHONEY. If my colleagues will indulge me, much as I am enjoying this argument back and forth on the question, and difficult as I find it to restrain myself from participating in it, I feel an obligation to the Senator from Kansas, who was No. 2 on our program this morning.

I had expected to hold Mr. Ellis down to a half hour. He has now been on an hour and a half. I know Senator Carlson has other obligations.

If the Senators will agree, I will ask him now if he will be good enough to make his statement.

Senator KERR. May I ask the witness one more question before you do that, Mr. Chairman?

Senator O'MAHONEY. Of course.

Senator KERR. Will you yield for that, Senator?

Senator CARLSON. Yes.

Senator KERR. I was quite interested in the question about private enterprise. I would like to ask the witness if it is not a fact that farmers are the largest and the most rugged and the most devoted, and the most courageous group of free enterprisers in this country, and if it isn't a fact that now they are the group which profits the least from it.

Mr. ELLIS. I would agree with that statement, Senator.

Senator KERR. Thank you, Mr. Chairman.

Senator O'MAHONEY. Senator Carlson.

STATEMENT OF HON. FRANK CARLSON, UNITED STATES SENATOR FROM THE STATE OF KANSAS

Senator CARLSON. Mr. Chairman, I am a little embarrassed to break into this hearing in this way.

Senator O'MAHONEY. You are not breaking in.

Senator KERR. I want to say that my great friend, the Senator from Wyoming, Senator Barret, who engaged in this colloquy with me, and myself are both grateful to you for giving us a graceful manner by which to terminate our discussion.

Senator CARLSON. Thank you very much. There is a Post Office and Civil Service Committee which is withholding the opening of their hearing until I can report. I appreciate very much the kindness of the chairman and Senator from Oklahoma, and the chairman of the subcommittee, for the privilege of appearing in behalf of a program on the conservation of control and water runoff and for beneficial uses and study of our renewable natural resources.

I realize you are holding this hearing on Senate Resolution 248, which deals with this subject. On February 17, last year, I introduced Senate 1019 which establishes a commission on the conservation, development, and use of renewable natural resources. This bill was re-

ferred to the committee, of which the distinguished Senator from Montana, Mr. Murray, is chairman. I wrote Mr. Murray and asked if he would not get reports on this bill, and permit me to bring in witnesses to testify on it. He was very kind. He did get reports from the various agencies, and stated that I could appear, he was confident, and bring in some witnesses who would be glad to testify on the control of water runoff in this Nation in which I have a great interest.

Our lands, our water, our forests, and our other natural resources on which depend the continued growth, development, and economic prosperity of our Nation must be preserved for future generations.

It is my contention that we must have not merely a short-range program, but a program looking toward the future.

Senate bill 1019 authorizes and establishes a commission known as the Commission on Renewable Natural Resources, which when created would make a thorough study not only of the future utilization of our natural resources, but also recommend a program whereby the Federal and State Governments would cooperatively deal with this problem.

The chairman advises me that on February 9, 1957, the bill was referred for comment to the Departments of Interior, Agriculture, Commerce, and Army, and the Bureau of the Budget. An adverse report was received from the Bureau of the Budget and the Department of Commerce. The Department of Agriculture and the Department of Interior, while not objecting to the bill, raised questions as to the necessity at this time for further general studies of renewable natural resources.

While I regret sincerely the comments and decisions made by the various Government agencies, it will not deter me from pressing for a program whereby the Federal Government and the States can cooperatively deal with the problems of drought, decreasing water supply and the erosion of our soil.

Water, soil, forests, and the wildlife that lives in and upon them are inseparably bound up together. In my opinion, we will be making great progress when we establish a program for the orderly development and sustained use of the Nation's renewable natural resources as a declared policy of Congress and the joint responsibility of the Federal Government, the States, their subdivisions and the public and provide that the policy should be carried out on a cooperative basis.

E. H. Taylor, formerly associate editor of the Country Gentleman, and who has made a great study of this problem, speaking before a prelegislative conference of West Virginia on November 15, 1957, stated:

> The available water supply has already become a factor influencing the movement of industry and people, as you have seen happening in your lower river valleys. There is hardly an industrial process that does not directly or indirectly require large quantities of water. So industries will locate where there is usable water and people will go where the jobs are.

We have had studies of our water resources, reports and plans for their development that have grown to library proportions. All of them agree on the impending seriousness of the water situation. The Nation's use of water has doubled with each 25-year period since this century began and the time is coming when there won't be enough water for all the things we want to use it for unless we act to conserve and store it and prevent the loss of so much of it through wasteful floods.

Not long ago Dr. Lawrence R. Hafstad, director of the research staff of General Motors' new technical center, in reviewing the Nation's industrial resources, said that, "The most critical material of the future probably will be water."

A successful water policy must be geared in with a comprehensive natural resources policy. Water is only a part of the inseparable complex of land, water, forests and the living creatures that have their habitat in and upon them.

Presently the Federal devices that have been set up for coordination are themselves divided and administratively complicated.

It is for that reason we need a correlated program providing for Federal, State, and local cooperation.

Upstream measures for land and water conservation and watershed development and downstream engineering works for flood control and channel improvement are not correlated as they must be if a complete program of water management is to be achieved.

The States, moved chiefly by concern over their water resources, are beginning to act to conserve and develop their renewable natural resources. More than two-thirds of them, within the past 2 years, have taken legislative action of one kind or another in regard to water. A number of them have studies underway preparatory to setting up State programs.

In Ohio, for example, the State legislature, by unanimous vote of both houses, appropriated $200,000 to begin basic inventories of the water and related natural resources in each drainage basin in the State, and to develop a plan on a watershed basis that will recognize the variety of uses to which water can be put and the need for its retention and control.

This was followed up last fall by the appointment of a water study committee to formulate a program on which the State can begin work. Although Ohio is a comparatively well watered State, with 39 inches of average annual rainfall, the increasing industrial, municipal and agricultural uses of water are already pressing upon the available supply in a number of areas.

In West Virginia, a three-dimension program is under consideration. It is intended to develop the opportunities offered by the State's water, forest, and outdoor recreational resources.

In Wisconsin the State legislature has made the water-shed the basis for resource development and appropriated $500,000 to get started on this work. Programs of this kind are up for consideration in a number of State legislatures this winter.

As a necessary preliminary to their resource programs the States are putting their administrative houses in better order—and setting an example for the Federal Government. No less than 17 of them have put their resource agencies together in a single department of conservation or natural resources, as it may be called. Colorado was the latest to take this action, bringing 14 separate agencies together in 1 department.

These moves are being made by the States because they are becoming acutely aware of the importance of water and the other renewable natural resources to their future destiny.

The report by the Interior Department's Division of Water Resources, the latest available, shows that, in the 5-year period, 1950–55,

industrial use of water increased 43 percent and public use 21 percent. The upsurge in population, the normal expansion of industry, supplementary farm irrigation, and recreational needs all point to steadily increasing demands on the Nation's water resources.

The available water supply has already become a fctor influencing the movement of industry and people. There is hardly an industrial process that does not, directly or indirectly, require large quantities of water, the new technologies being especially heavy users.

Industries will go where there is usable water, and people will go where industries provide jobs.

As Walter L. Picton, water expert of the United States Department of Commerce, said in a recent review of past and prospective water use in the United States:

> The future pattern of regional growth and development will depend on the wisdom and foresight of State and local areas in developing and allocating water for the optimum benefit.

And he closed his review with the statement that:

> Careful planning for the development and allocation of water resources will be required to advance the economic development of each area and region in the Nation. Achievement of this goal will tax the foresight and ability of the Nation's planners for the next two decades.

The pressures on our outdoor recreational resources are another cause of State concern. National and State parks are becoming crowded; fishing waters and hunting grounds are too scant to meet the demands on them. Increased population, good roads, and the universal ownership of motorcars, more leisure time, and the necessity to escape occasionally from the tensions of modern life all contribute to the situation.

As Assistant Secretary of the Interior Ross Leffler recently said:

> Outdoor, nature-produced recreation, which rehabilitates the mind and feeds the nerves and spirit, has become one of the great basic needs of this country.

Like the demands on our water resources, it is a need that will grow greater with each year.

One of the advances by the States that we should heed here is in making the watershed the basis for their resource planning. This makes possible the actual management of water, which begins with the condition and cover of the land on which the rain and snow fall and goes all the way back to the upstream reaches of the watershed.

We are constantly getting a better understanding of the interdependence of these natural resources. To borrow the words of a great book of wisdom, they are all "parts one of another" in the economy of nature. They are bound together with chains of cause and effect that can be used to advantage or be very hurtful if ignored.

The watershed is a natural operational unit, in which the interdependence of the various resources can be put to practical use in multipurpose programs. The measures that conserve and improve one resource can be made to complement and reinforce the others. An example of this is the Muskingum Watershed Conservancy District in Ohio, where flood-control, water-storage, reforestation, soil-conservation, and outdoor recreational benefits have all been achieved by man and outdoor recreational benefits have all been achieved by man and nature working together in a multipurpose program. It was a fine

example of Federal, State, and local cooperation, with both authority, and responsibility resting in local hands.

In fact, there is a lack of any definite policy to correlate Federal action with the programs that the States will require and are beginning to develop. We have a cooperative policy for a single resource in the Soil Conservation Act; we have cooperative water programs of a very limited reach in the two small watershed programs, and another quite limited program for fish and wildlife. But we have no comprehensive policy that will enable the Federal Government, the States, and local subdivisions to join together in a common program.

The principle of joint Federal, State, and local responsibility for our natural resources is, I think, fairly well accepted. The desirability of cooperation among them in meeting our natural-resource problems and opportunities is also, generally, agreed upon. But, so far, we have done little to make either effective.

Now, while the States are studying and preparing programs to fit their requirements, is a good time for Congress to enact a national policy and have it ready for the needs of the future. This policy should declare that the conservation, orderly development, and sustained use of the Nation's vital renewable natural resources shall be the joint responsibility of the Federal Government, the States, and local subdivisions, and that it shall be carried out on a cooperative basis.

This action should establish a Commission on Renewable Resources, composed of properly qualified members, to formulate a practical program by which the policy can be put into effect. This should be a positive program, designed not merely to meet resource troubles but to develop the multiple opportunities they offer for increasing public benefits. The State programs, which it will encourage, can be synchronized with major basin programs. Indeed, they should be a necessary preliminary to such large-scale improvements.

The ever-increasing concern about water, now becoming the most critically urgent resource problem, will, sooner or later, be dealt with cooperatively. The time will come when we will be forced to have a national policy that will formulate a practicable program which will combine the interests of the Federal, State, local, and public to an end that will correlate the use of our renewable resources for beneficial use.

Mr. Chairman, I again want to say how much I appreciate your kindness in permitting me to appear this morning.

I would like S. 1019, entitled "A bill to establish a Commission on the conservation, development, and use of renewable natural resources," inserted at this point of the record.

The CHAIRMAN. That will be done, Senator Carlson. Following S. 1019 will appear the reports of the Department of the Interior, the Bureau of the Budget, the Department of Commerce, and the Department of Agriculture.

Thank you very much, Senator. I am sorry that you have been delayed.

(S. 1019 and the reports referred to are as follows:)

[S. 1019, 85th Cong., 1st sess.]

A BILL To establish a commission on the conservation, development, and use of renewable natural resources

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is hereby declared to be the policy of Congress that the land, waters, forests, and related natural resources of the United States constitute an essential basis for the national security and the physical, social, and economic welfare of the American people; that the conservation, orderly development, and sustained use of the renewable natural resources of the United States is the joint responsibility of the Federal Government, the States, the various subdivisions of government, and the people thereof; and that this policy shall be effectuated through cooperation of the Federal Government, the States and their various subdivisions, the owners and users of these resources, and private groups and organizations serving as a medium for public participation.

SEC. 2. (a) For the purpose of studying and recommending means of carrying out the policy set forth in section 1 of this Act, there is hereby established a commission to be known as the Commission on Renewable Natural Resources (hereinafter referred to as the Commission).

(b) Service of an individual as a member of the Commission or employment of an individual by the Commission as an attorney or expert in any business or professional field, on a part-time or full-time basis, with or without compensation, shall not be considered as service or employment bringing such individual within the provisions of section 281, 283, 284, 434, or 1914 of title 18 of the United States Code, or section 190 of the Revised Statutes (5 U. S. C. 99).

SEC. 3. The Commission shall be composed of twelve members appointed by the President as follows: one member each from the Department of Agriculture, the Department of the Interior, and the Department of the Army; three members respresenting the States; three members representing local subdivisions of government; and three members representing the public at large. All members of the Commission shall be qualified by expert knowledge of or experience with the problems and management of the lands, waters, forests, and related renewable natural resources of the United States. One member of the Commission shall be designated by the President as Chairman and another as Vice Chairman.

SEC. 4. (a) The Commission shall study and investigate the present condition of the renewable natural resources of the United States, the probable future demands upon such resources, and shall formulate a program for the practical carrying out of the policy established in section 1.

(b) The Commission shall submit a report to the President for transmittal to the Congress, including proposals for such legislative enactments and administrative actions as in its judgment are necessary to carry out its recommendations, on or before March 1, 1958, and shall submit its final report not later than June 30, 1958, at which date the Commission shall cease to exist. The Commission may, from time to time, submit such interim reports as it deems desirable or as the President may request.

SEC. 5. (a) There are hereby authorized to be appropriated such amounts as may be necessary to carry out the provisions of this Act.

(b) Each member of the Commission shall receive $50 per diem when engaged in the performance of duties vested in the Commission, except that no compensation shall be paid by the United States, by reason of service as a member, to any member who is receiving other compensation from the Federal Government, or to any member who is receiving compensation from any State or local government.

(c) Each member of the Commission shall be reimbursed for travel, subsistence, and other necessary expenses incurred by him in the performance of duties vested in the Commission.

(d) The Commission may appoint and fix the compensation of such employees as it deems advisable without regard to the provisions of the civil-service laws and the Classification Act of 1949, as amended.

(e) The Commission may procure, without regard to the civil-service laws and the classification laws, temporary and intermittent services to the same extent as is authorized for the departments by section 15 of the Act of August 2, 1946 (60 Stat. 810), but at rates not to exceed $50 per diem for individuals.

SEC. 6. (a) The Commission or, on the authorization of the Commission, any subcommittee or member thereof, may, for the purpose of carrying out the provisions of this Act, hold such hearings and sit and at such times and places, administer such oaths, and require, by subpena or otherwise, the attendance and testimony of such witnesses and the production of such books, records, correspondence, memoranda, papers, and documents as the Commission or such subcommittee or member may deem advisable. Subpenas may be issued under the signature of the Chairman of the Commission, of such subcommittee, or any duly designated member, and may be served by any person designated by such Chairman or member. The provisions of sections 102 to 104, inclusive, of the Revised Statutes (U. S. C., title 2, secs. 192–194) shall apply in the case of any failure of any witness to comply with any subpena or to testify when summoned under authority of this section.

(b) The Commission is authorized to secure from any department, agency, or independent instrumentality of the executive branch of the Government any information it deems necessary to carry out its functions under this Act; and each such department, agency, and instrumentality is authorized and directed to furnish such information to the Commission, upon request made by the Chairman or by the Vice Chairman when acting as Chairman.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D. C., July 5, 1957.

HON. JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington, D. C.

MY DEAR MR. CHAIRMAN: This will acknowledge your letter of February 19, 1957, inviting the Bureau of the Budget to comment on S. 1019, a bill to establish a commission on conservation, development, and use of renewable natural resources.

The policies and program of the United States relative to the conservation, development, and use of renewable natural resources have been considered in whole or in part by a number of study groups in recent years. Recently completed studies include those by the Commission on Intergovernmental Relations, the Commission on Organization of the Executive Branch of the Government, and the President's Advisory Committee on Water Resources Policy.

The Bureau of the Budget does not, therefore, believe it to be necessary to establish a commission of this type for the purposes contemplated by S. 1019. To the extent that available studies do not provide sufficient information concerning the present condition of the Nation's renewable resources and the probable demands of the future, the President may call upon the concerned executive departments and agencies for such data and recommendations as he may require. The advice of State and local officials and of representatives of the general public can also be drawn upon by the President and the executive agencies in a variety of ways.

Attention is also called to the fact that S. 1019 as presently drafted requires the proposed Commission to "submit a report to the President for transmittal to Congress, including proposals for such legislative enactments and administrative actions as in its judgment are necessary to carry out its recommendations, on or before March 1, 1958, and shall submit its final report not later than June 30, 1958. * * *" Thus the Commission would have considerably less than a year in which to complete a comprehensive investigation of land, water, forest, and related renewable natural resources.

For the foregoing reasons, the Bureau of the Budget does not recommend the enactment of S. 1019.

Sincerely yours,

(Signed) PERCIVAL F. BRUNDAGE,
Director.

DEPARTMENT OF THE INTERIOR,
Office of the Secretary,
Washington, D. C., July 11, 1957.

Hon. JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington, D. C.

DEAR SENATOR MURRAY: You have requested a report from this Department on S. 1019, a bill to establish a commission on the conservation, development, and use of renewable natural resources.

While this Department would not object to enactment of S. 1019, it has doubts concerning both its necessity at this time and the ability of the proposed commission o complete the task that would be assigned to it within the short time prescribed by the bill.

If enacted, S. 1019 would create a 12-man commission to study and investigate the present condition of the renewable natural resources of the United States, the probable future demands upon such resources, and [to] formulate a program for the practical carrying out of the policy established in section 1. The policy referred to is declared to be "that the land, waters, forests, and related natural resources of the United States constitute an essential basis for the national security and the physical, social, and economic welfare of the American people; that the conservation, orderly development, and sustained use of the renewable natural resources of the United States is the joint responsibility of the Federal Government, the States, the various subdivisions of government, and the people thereof; and that this policy shall be effectuated through cooperation of the Federal Government, the States and their various subdivisions, the owners and users of these resources, and private groups and organizations serving as a medium for public participation."

The Commission would, under the terms of the bill, be composed of representatives of this Department and the Departments of Agriculture and the Army, 3 members representing the States, 3 representing local government, and 3 representing the public at large. It would be directed to submit its report to the President on or before March 1, 1958, and to the Congress on or before June 30, 1958.

Large segments of the subject matter proposed to be given to the Commission for study have recently been studied by such organizations as the first and second Hoover Commission, the Commission on Intergovernmental Relations, the President's Materials Policy Commission, and the Presidential Advisory Committee on Water Resources Policy. Continuous attention, moreover, is constantly being given to the land, waters, forests, and related natural resources of the United States by regularly constituted agencies of the executive branch and by standing committees of the Congress.

The Bureau of the Budget has advised that there would be no objection to the submission of this report to your committee.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

THE SECRETARY OF COMMERCE,
Washington, D. C., July 11, 1957.

Hon. JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate, Washington, D. C.

DEAR MR. CHAIRMAN: This is in reply to your request of February 19, 1957, for the views of this Department with respect to S. 1019, a bill to establish a commission on the conservation, development, and use of renewable natural resources.

The Commission proposed to be established by S. 1019 would study the problems relating to conservation, development, and use of renewable natural resources; formulate a program designed to meet the needs revealed by the study and report thereon to the President for transmittal to the Congress. The proposed Commission would be dissolved on June 30, 1958.

This Department recommends against enactment of S. 1019.

Although the Department endorses the objectives of S. 1019, we believe that the agencies primarily responsible for conservation and development of the natural resources of this country are acutely aware of the need for conservation,

development, and full utilization of land, water, forest, and related natural resources, and are taking such steps as are feasible to meet this need on an orderly basis. A commission such as is proposed by S. 1019 would not, in our opinion, be likely to contribute any additional information or new policies which would compensate for the costs of establishing and operating the Commission.

We have been advised by the Bureau of the Budget that it would interpose no objection to the submission of this report to your committee.

Sincerely yours,

SINCLAIR WEEKS, *Secretary of Commerce.*

DEPARTMENT OF AGRICULTURE,
Washington, D. C., July 11, 1957.

Hon. JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate.

DEAR SENATOR MURRAY: Reference is made to your letter of February 19, 1957, requesting a report on S. 1019, a bill to establish a commission on the conservation, development, and use of renewable natural resources.

We do not object to the bill, but believe there is no urgent need at this time for further general studies of renewable natural resources as proposed in S. 1019. There is present authority in the executive departments to accomplish the objectives of this bill.

In recent years, moreover, a number of special studies dealing in whole or in part with natural resources also have been made, including investigations by the President's Water Resources Policy Committee in 1950 and the President's Materials Policy Commission in 1952. More recently completed studies include those by the Commission on Intergovernmental Relations, the President's Advisory Committee on Government Organization, the Commission on Organization of the Executive Branch of the Government, and the President's Advisory Committee on Water Resources Policy. The proposed Commission would have less than a year in which to complete a comprehensive investigation of land, water, forests and related renewable natural resources.

The bill would establish a temporary Commission on Renewable Natural Resources, composed of 12 members appointed by the President as follows: 1 member each from the Departments of Agriculture, Interior, and the Army; 3 members representing the States; 3 members representing local subdivisions of government; and (3) members representing the public at large. The Commission would (1) study the present condition of the lands, waters, forests, and related renewable natural resources of the United States, (2) study probabble future demands upon such resources, and (3) formulate a program for carrying out resource-conservation policies through cooperation of the Federal Government, the States and their subdivisions, the owners and users of resources, and public and private groups. The Commission would submit a final report to the President by June 30, 1958, including proposals for legislation and administrative action necessary to carry out its recommendations.

This Department is deeply involved in natural resource conservation programs and is much interested in proposals for improvement of these programs. For example, management of 180 million acres of national forests represents an important segment of the Department's work. Other Federal-State cooperative programs conducted through the Soil Conservation Service, the Extension Service, the Agricultural Research Service, and the Forest Service also deal with such natural resources as land, water, and forests.

These programs and related natural resource policy issues are subject to continuing review both by the Department and by the standing congressional committees dealing, for example, with agriculture, forestry, and public lands. Studies of various natural-resource problems and policy issues are continually being made by this and other departments.

The Bureau of the Budget advises that there is no objection to the submission of this report.

Sincerely yours,

(Signed) TRUE D. MORSE,
Acting Secretary.

Senator Barrett, before you go, I would like to have an understanding with Mr. Ellis.

STATEMENT OF CLYDE T. ELLIS, GENERAL MANAGER, NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION—Resumed

Senator O'MAHONEY. You were requested, Mr. Ellis, to present some figures dealing with the matter of appropriations for these various resource development projects. Do you have those figures available for us?

Mr. ELLIS. I will submit them.

(The information appears in the appendix on p. 197.)

Senator BARRETT. Mr. Chairman, it might facilitate this whole matter, if it is agreeable to Mr. Ellis and yourself, if he will submit the figures to me. Maybe the figures he will supply will be about the same as the ones that I could supply. I don't see how they could be different. All we are asking for is the appropriations for REA, the appropriations for the Army engineers, and the appropriations for the Bureau of Reclamation for the last 5 years.

That is what we are talking about; isn't it?

Mr. ELLIS. That is just a part of what I was talking about when I said the programs have been squeezed. Furthermore, there have been appropriations made and held back, not used.

Senator BARRETT. You can call attention to that. That may be possible. It seems to me that if the appropriations for the last 5 years have been as large or larger than they were for the preceding 5 years, then certainly there has not been any squeezing, providing that they have not been held back after the Congress made them available.

Senator KERR. And provided they were recommended by the Budget Bureau.

Senator BARRETT. Just a moment, Senator Kerr.

Senator KERR. If you submit the figures, Mr. Ellis, I would like to have you make a notation as to which ones of them were appropriated by the Congress over the adverse recommendation of the Budget Bureau.

Senator BARRETT. They all have to be approved by the President.

Senator KERR. But you wouldn't object to that information being in the data submitted, would you?

Senator BARRETT. I don't object to the information being made available. I object to the statement being made that the administration isn't entitled to some credit for the appropriation of the money.

If agreeable, I can get the figures very readily and put them into the record, if you would like.

Senator O'MAHONEY. Inasmuch, Senator Barrett, as you made reference to the upper Colorado River storage development, and inasmuch as your language was capable of the inference that the credit for starting the upper Colorado River storage project belongs to the President, I want to make it clear, because I can't allow the record to be bare upon this point, that when I was a member of the Appropriations Committee, I succeeded in obtaining the first appropriation, some $500,000, as I recall, for the preliminary studies which enabled the Bureau of Reclamation to prepare the reports, on which the authorization was eventually made.

Senator BARRETT. There isn't any question about that. What I am saying is this, that the upper Colorado River project would never

have been authorized by the Congress had it not been that President Eisenhower got in and supported it 100 percent and used the power of his office to get that legislation enacted. Certainly the Senator from Wyoming will admit that that had not been done and could not have been done previously. As far as I know, I don't believe there was any serious effort made to get the authorization prior to that.

Senator O'MAHONEY. The record must be clear that in the 83d Congress, in which the President had a majority control—had control of the White House and a Republican majority had control of Congress—the authorization bill was before the Congress and it was not enacted. That Congress adjourned without authorizing the bill. It was not until the next Congress, when a Democratic Congress was in power, that the authorization was passed.

Senator BARRETT. In both Congresses, the President supported the upper Colorado River 100 percent.

Senator O'MAHONEY. Of course. I am very happy he did. But we can't give him exclusive credit.

Senator BARRETT. Can you give any other President credit for putting the upper Colorado River through?

Senator O'MAHONEY. I can give credit to many members in the Democratic Party in the Congress.

Senator BARRETT. We are talking about Presidents.

Senator O'MAHONEY. And leaders of the Democratic Party in the State of Wyoming. The late Governor Hunt, for example, was the man who called the conference of the upper basin States by which the agreement on the division of the waters was made.

Senator BARRETT. The Senator knows we are all for the upper Colorado River project out in Wyoming. There is no question about that. This whole argument came up because of the fact that Mr. Ellis, and my good friend from Oklahoma, said that this administration had not favored any new starts. What I am saying is that this administration favored the biggest new start ever made in the history of America.

Senator O'MAHONEY. Of course, I will say to my colleague from Wyoming, that the present policy of the administration, set forth clearly in the budget, is not to begin any new projects of this kind. I have before me the budget in brief. This is published by the Bureau of the Budget, Executive Office of the President, on October 1, 1957. On page 17 there of it appears in these words:

> **One billion four hundred million dollars for natural resources: The conservation and development of our natural resources will account for 2 cents of each dollar collected in 1958. Wherever possible the Federal Government works in partnership with State, local, and private groups on these programs. This has the result of multiplying the effectiveness of Federal spending. Major natural resource programs are for flood control, navigation, irrigation, and power projects. Other natural resource programs include caring for national forests and peaks, protecting fish and wildlife, and fostering a healthy mining industry.**

I call attention to the fact that when the President's budget for 1958 was presented in January, and the Federal budget in brief for fiscal 1959 now contains the figures as of this time.

On page 28 it appears:

> **Natural resources, $1,492 million, 2 percent of 1959 budget expenditures.**

I have had personal contact with the Director of the Budget, with the Chairman of the Council of Economic Advisers, and I know

from their answers that the policy now has been to cut back on water programs. My own belief is that this is a mistake. We are engaged in a cold economic war, and the greatest need of our time. With the interest upon the national debt increasing, with the administration asking for a $5 billion increase in the ceiling of the national debt, it is essential for us to do what we can, I think, to develop the resources of the country in order that we may create the revenue which will enable us to pay the increasing national debt and the interest thereon.

Senator KERR. Would the Senator yield there for a question?

Senator O'MAHONEY. Yes.

Senator KERR. Is the Senator aware that the $1,400,000,000 included in the budget as the total for resource development in our country by the Federal Government is about 75 percent of the amount which American Telephone & Telegraph has indicated that they expect to spend this year in expansion of their services to the American people?

Senator O'MAHONEY. The Senator is quite right.

Further, this publication says:

Expenditures in 1959 will be greater than in any of the 5 preceding years because of the very high level of commitments on projects already underway. To avoid adding to these commitments at this time, no new project starts are proposed in the budget for 1959.

On page 14 of the Federal Budget in brief, as published by the Executive Office of the President, the Bureau of the Budget, there is a list of all the 1959 estimated receipts and expenditures. The estimated expenditures are of great interest, because nobody can challenge them.

Forty-five billion eight hundred million dollars for major national security; $7.9 billion for interest on the national debt; $5 billion for veterans; $4.6 billion for agriculture; $3.7 billion for labor and welfare; $1.6 billion for commerce and housing; $1.5 billion for natural resources.

That was a rounding out of the figure of $1.492 billion.

One billion four hundred million dollars for general government; $1.3 billion for international affairs; $1.1 billion for allowances for legislation and contingencies.

Then it appears from this information presented by the Bureau of the Budget that next to major national security, which includes foreign aid—foreign military aid—and national defense, next to that the largest Government expenditure at this time is for interest upon the national debt, $7.9 billion. That is almost $3 billion more than the estimated expenditure for the obligations owed to veterans. It is $3.3 billion more than the expenditures for agriculture.

I think there can be no question at all that on the record as presented by the administration, the appropriations, the estimates for natural resources, are toward the bottom of the list.

Senator KERR. And that there are a number of American corporations which individually have forecast for this year the expenditure of greater sums of money in the expansion of the business of a single corporation than is recommended in that budget message for water and soil resource development in this Nation.

Senator O'MAHONEY. Mr. Ellis, will you present your figures? Consult Senator Barrett about them. If you have a copy of them after that, you may file them with the committee.

Mr. ELLIS. Yes. May I ask this further question? I indicated to you that I could be back with the figures this afternoon. I can.

But I couldn't prepare a statement and have it ready by this afternoon. If I may have some indication of the time, may I give them to you some time tomorrow, Senator?

Senator BARRETT. That would be quite agreeable to me, as far as I am concerned. I think the figures I am interested in, and which Senator Kerr is interested in, are available from the departments downtown.

Senator KERR. You can get it from the Appropriations Committee. I would say the Appropriations Committee staff can get them.

Mr. ELLIS. If you are going to rely on that, Mr. Chairman, may I emphasize one further thing? The word "appropriations" I did not mention, I do not believe, in that sentence, and that would be only a part of my intended meaning that these programs have been squeezed.

Senator O'MAHONEY. We have your statement, Mr. Ellis. Thank you very much.

Mr. ELLIS. Thank you.

Senator O'MAHONEY. Senator Jackson, do you have a special statement you want to make now, or would you prefer to listen to Senator Ellender finish the statement he began yesterday? I think probably it would be well for you to proceed. The Senator has been very kind.

Senator JACKSON. Thank you, Mr. Chairman.

STATEMENT OF HON. HENRY M. JACKSON, UNITED STATES SENATOR FROM THE STATE OF WASHINGTON

Senator JACKSON. My statement can be shortened by my asking that Committee Print No. 3 be filed as a part of the committee records. I do not believe it is necessary to incorporate it into the record proper.

Senator O'MAHONEY. Committee Print No. 3 is a supplemental memorandum of the chairman of the Committee on Interior and Insular Affairs, together with an addendum prepared by the Honorable Henry M. Jackson, Senator from the State of Washington. It is available to all members of the committee.

Senator JACKSON. I will submit a condensation of the information for the record at a later date, which was prepared by the Library of Congress.

Senator O'MAHONEY. You do not care to make a statement, then?

Senator JACKSON. No, I do not think it is necessary at this time.

Senator Ellender, I am sure, has covered an area that I did not get a chance to see out in Siberia, with reference to the Soviet Union. We both had a chance, I believe, to see the dam under construction just outside of Stalingrad, on the Volga, which will produce about 2,300,000 kilowatts. I believe Grand Coulee at this time has an installed capacity of about 1.9 million kilowatts. In any event, this one dam was larger than Grand Coulee.

Senator O'MAHONEY. Thank you.

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STATEMENT OF E. C. ITSCHNER, MAJOR GENERAL, UNITED STATES ARMY, CHIEF OF ENGINEERS

Senator O'MAHONEY. General, the hearing this morning lasted a little longer than we anticipated, but I hope you enjoyed it.

General ITSCHNER. It was very interesting this morning.

Senator O'MAHONEY. Please identify yourself.

General ITSCHNER. Mr. Chairman, my name is Emerson C. Itschner, Major General, United States Army, Chief of Engineers.

Senator O'MAHONEY. How long have you held this position, General?

General ITSCHNER. I have held this position for about 16 months, sir.

Senator O'MAHONEY. How long have you been in the Corps of Engineers?

General ITSCHNER. I have been in the Corps of Engineers since my graduation from the United States Military Academy in 1924, sir.

Senator O'MAHONEY. And you have been engaged in engineering work for the Army ever since?

General ITSCHNER. That is correct, sir. I have been in the Corps of Engineers, engaged in engineering work of various types, principally on water-resource development problems, since that time.

Senator O'MAHONEY. Very well, sir. You may proceed.

General ITSCHNER. Mr. Chairman and gentlemen, in response to the invitation of Senators Murray and Chavez to Secretary Brucker, I am representing the United States Army before this extremely important and most forward-looking committee.

I shall present a synopsis of the information we have assembled in the Corps of Engineers, concerning the development of water resources within Soviet Russia and China.

In this respect, I would like to compliment Mr. Michael Straus, your consultant, on the thorough and illuminating report which he prepared on this subject for your committee, and which I have read most thoroughly. I have not been to Russia, and, therefore, cannot speak with the authority that Senator Ellender did in his very fine presentation on this subject yesterday. I also had the pleasure yesterday of hearing in Chicago, at the National Military-Industrial Conference, a very stirring and thought-provoking speech by Senator Jackson. It is apparent that he, too, is very familiar with developments in that country.

However, from the Army Map Service, an important agency of the Corps of Engineers, I have assembled and will present to this committee a considerable amount of data from which can be deduced a fair picture of what is going on in the way of river improvements and water resources development in the Soviet Union. I have a statement which, with the committee's permission, I shall read. The United States Corps of Engineers is concerned with Soviet water resource development as part of our overall military engineer intelligence mission, and also because we are interested in how the water resource development and flood-control mission, which is one of our principal missions in the United States, is performed in other lands.

Much of our information is obtained from Soviet sources. The Soviets are proud of their accomplishments in this field and publicize

them widely. Sometimes the task of coordinating and interpreting the facts and statistics is difficult and confusing, and we do not always have all the detail we would like.

For example, it is all but impossible to measure their efforts in monetary terms. Nevertheless, I believe we have enough information to give this committee an evaluation of Soviet accomplishments, progress, and programs in the water resource field.

SUMMARY OF SOVIET STATUS

The Soviet water resource effort is demonstrating to the world what can be done in this field by well-considered, long-range planning and a willingness to make sacrifices in present standards of living in order to achieve the goal of a great future industrial development. Indeed, the Soviets have given water resource development a priority second only to the development of heavy industry designed to support military programs. This fact must be viewed in the light of Secretary Khrushchev's statement:

> We declare war on the United States in peaceful production * * * We will win over the United States.

Thus they have openly challenged us to a competition for world economic dominance. Obviously, in view of the priority given it, they regard their race against us in water resource development as a key contest in this competition for world supremacy.

I would like to summarize for you how the race stands today.

In hydroelectric power development, the Soviets already approach us in total installed capacity and have individual projects under construction that far exceed any American project in capacity.

Senator O'MAHONEY. May I interrupt you, General?

General ITSCHNER. Yes, sir.

Senator O'MAHONEY. That is a very striking statement. Do I understand that you mean that at the present moment the Soviets are approaching the United States in total installed hydroelectric capacity?

General ITSCHNER. That statement is correct, sir, and I shall elaborate upon that a little later on to give the precise figures.

Senator O'MAHONEY. Let me say that the statement is frequently made that although Soviet development has increased at a very rapid rate, the Soviets began from such a low position that their rate of growth does not mean that they are approaching our capacity. You say they are.

General ITSCHNER. With respect to hydroelectric development, sir, I do.

Senator O'MAHONEY. Thank you very much.

Senator KERR. May I ask a question?

Senator O'MAHONEY. Yes, Senator Kerr.

Senator KERR. Do you cover in here, General, the possibility that they have one project either in the state of planning or about to be started for construction which would have a greater hydroelectric generating capacity than all of the projects that have been built in all of our history by the corps?

General ITSCHNER. That statement is correct, sir. They have one project which is in the preliminary stages of development, which will

have 6 million kilowatts of installed capacity, whereas the entire installed capacity of all the generators at Corps of Engineers' projects throughout the country is about 5,250,000 kilowatts. Incidentally, we have more hydroelectric power installed than any other agency in the country. If I may continue, sir, I do cover some of these points in the statement.

Senator KERR. I see. Thank you.

General ITSCHNER. In inland waterway navigation, they have projects that rival ours, and plans that probably surpass ours, though the amount of navigation on their waterways is less than that on American waterways.

In irrigation, the types of development are considerably different, but the Soviet effort is roughly comparable to ours in scope. They have bigger projects than ours, and they probably are irrigating new acres at least as fast as we are.

In other aspects of water resource development, such as flood control, water supply, and recreation, they do not have projects equal to ours but appear not to need them at this time.

Their engineering, vessels, and construction, allowing for their different circumstances, appear to be equal to ours.

Their power equipment and engineering, in items like generators and transmission lines, are excellent, and they are superior to ours in a few characteristics.

The most remarkable fact about the Soviet water resource effort is its rate of growth. At the end of World War II much of the European portion of the Soviet Union was devastated. Their major programs have been accomplished largely within 10 years, the bulk of them, in fact, within the past 5 years. The economic and strategic import of the Soviet water resource effort is most significant. The Soviets are basing the creation of new economic provinces, including new industrial and agricultural complexes, squarely upon multiple-purpose river-development plans. And they are using water resource development as a means of dispersing industrial and other strategic installations throughout their vast domain, an area three times as large as the United States.

SOVIET ENGINEERING CAPABILITY

I shall try to summarize the Soviet achievement in each of the principal fields of water resource development; but first, by way of background, I should like to describe certain general characteristics of their work, to indicate the caliber of capability they apply to the solution of their problems, and, by way of illustration, to describe briefly some of their engineering programs.

Most Soviet water resource projects are multiple purpose. The hydroelectric function receives emphasis and priority, but generally the gigantic Soviet power developments are associated with equally huge navigation or irrigation projects.

The Soviet Union does not have concentrations of population as we do along our eastern seaboard. Further, the short warm-weather season in some of the most populated areas relegates water recreation to a relatively minor position. Where needed, as in the Moscow area, water resource projects embrace both water supply and recreation.

Soviet demands for building materials, including concrete, are

great. Therefore they lean toward building very large earth and rockfill dams, using concrete only for critical portions such as locks, spillways, and powerplants. I might say the development in the United States, too, is along that line.

Most major Soviet rivers flow through generally flat terrain. Gradients are gentle and there are few gorgelike dam sites. Consequently, long, high dams are often required to provide the necessary heads. Seasonal variations in flow are great, and this also requires large reservoirs.

Many project sites, particularly in the European part of the Soviet Union, consist of a high bluff on one riverbank and a wide, flat flood plain on the opposite bank.

This has required the Soviets to develop engineering techniques for the construction of earth dams several miles in length, in addition to reinforced concrete powerplants, spillways, and navigation structures. Their engineers also have had considerable difficulty with poor foundation conditions.

According to their own accounts they have never had a failure; but we know of at least one project that encountered serious difficulties because of improper allowance for or handling of ice jams.

The wintry climate of the U. S. S. R. creates considerable construction difficulty during most of the year, but the Soviets have shown marked ingenuity in dealing with this handicap.

In particular, they have employed advanced techniques for minimizing delays in the placing of concrete in cold weather.

Soviet technology has proven itself to be completely adequate to meet technical problems in the water resource field. In the earliest phases of the effort, before World War II, their progress depended on technological advice and equipment from western nations, and some projects were built only by harsh exploitation of forced labor. Today, however, large projects are planned, engineered, and equipped entirely from within the Soviet Union. They are staffed by workers receiving premium pay rates, and there is very little, if any, use of forced labor.

Because of Soviet accounting, allocation, funding, and monetary procedures, it is meaningless to evaluate the Soviet effort in monetary terms. Ostensibly the program has been until recently financed through the sale of bonds to the public. Some 6 years ago the Government launched its seventh bond drive since World War II.

The goal of that 1 drive was to raise the equivalent of $7 billion for water-resource work. The program has grown since then. However, money made available for water-resource development is often diverted to other purposes.

They do not have to face some costs that we must face—notably the cost of land acquisition. Ownership is vested in the Government and all land disposition is under its sole control. Villages and towns in an area to be inundated can be arbitrarily moved to higher land or eliminated.

I would like at this time to introduce Captain Boerger, who will point out the places I shall mention, in order to save time.

For instance, before filling the Kuybyshev Reservoir on the Volga River, the entire city of Stavropol, with a population of 25,000, was moved to a new site, and several river ports, notably the one at Kazan, had to be completely rebuilt.

Senator KERR. General, has that reservoir been connected both to the Caspian Sea and the Black Sea?

Senator JACKSON. That is the Volga-Don Canal.

General ITSCHNER. I shall cover that system in just a little bit, Senator.

Senator KERR. All right.

General ITSCHNER. Flood control as we know it is a minor problem in the Soviet Union. The spring floods are regular and high, so there has been very little settlement in the flood plains of rivers. The large reservoirs built for river-flow regulation in connection with other functions also inherently serve to a certain extent a flood-control function.

When a reservoir impinges on a developed urban area, dikes are erected, and some of these dikes are several miles long and incorporate new river port installations. Otherwise, few levees have been built on river banks, and throughout the country most of the rivers are in their natural state over most of their courses.

There is little use of training works to improve channels or stabilize banks, and little or no use of cutoffs to shorten transit distances on meandering rivers.

As to the quality of Russian engineering, a British technical delegation recently inspected some of their projects and reported:

> Russian engineers are not lacking in engineering ability when dealings with the varied problems met in river control and development works * * *. They have been most successful with the projects they have attempted and they are obviously backed with sufficient technical know-how and experience to enable them to deal with any difficulties or troubles which may arise.

Senator O'MAHONEY. Have you any idea, General, from the magnitude of these projects, as you have described them, how large a force of educated and trained engineers the Soviets must have recruited to do this work?

General ITSCHNER. I do not, sir, have specific information on that particular question.

Senator O'MAHONEY. Judging by your own experience, what would be your conclusion?

General ITSCHNER I would estimate, sir, that they must have in the range of 25,.000 engineers at least working on their water resource development program.

Senator O'MAHONEY. This is a concentrated, driving program, is it?

General ITSCHNER. That is correct, sir. It is a very highly concentrated program. It is an accelerating program.

Senator KERR. How many engineers do we have devoted to the same objective?

General ITSCHNER. We have in the Corps of Engineers, sir, 8,000 engineers devoted largely to the water resource development program. Some of their efforts are on military construction. How many the other agencies have, I am not able to say.

Senator O'MAHONEY. May I ask former Commissioner Straus if he knows how many engineers are in the employ of the Bureau of Reclamation?

Mr. STRAUS. I think that the total at the present time, of engineers, is between three and four thousand. It has been a reducing number.

Senator O'MAHONEY. Then adding the Corps of Engineers' force of

engineers and the Bureau of Reclamation force of engineers, the General's estimate is that the Soviets have twice as many engineers engaged in this work as do we.

Senator JACKSON. You would have to add the private utilities, though. It wouldn't be very many, but there are some.

Senator O'MAHONEY. Yes; you are right.

General ITSCHNER. I think my estimate of 25,000 is, if anything, on the low side, Mr. Chairman.

Senator KERR. Then it would be indicated that a reasonable assumption is, as the chairman has suggested, that the Soviets have at least twice as many engineers devoted to the resource development of their water resources in Russia as we have in our country.

General ITSCHNER. I think that is a conservative estimate, sir. I should think there would be at least twice as many engaged in that activity in Russia.

Senator DWORSHAK. Does that include engineers employed by private concerns?

General ITSCHNER. Not in my estimate, no, sir.

Senator KERR. Giving reasonable effect to what you would estimate would be engaged in that effort privately, to what degree would that change the conclusion of your estimate, sir?

General ITSCHNER. That is quite difficult to estimate, sir. I realize that most of the activities of water resource development are not undertaken by private enterprise. It is largely limited just to hydroelectric plants, and generally the smaller hydroelectric plants. Making a pure guess, I would estimate perhaps another 2,000, just on the hydroelectric project development itself, not the transmission lines or the steam plants or anything like that.

Senator KERR. So that actually the addition of that figure would not basically change the statement, that they have generally twice as many as we?

General ITSCHNER. No, sir. I think quite surely that in the overall the Soviets must have at least twice as many engineers engaged in all phases of water resource development as we do.

Senator KERR. As we do in our country in its entirety?

General ITSCHNER. Yes, sir; I would estimate that, sir.

The quotation that I just gave, Mr. Chairman, was from a series of articles which appeared last September in the British technical publication Engineering.

Soviet construction has now reached levels of technique and scope nearly equal to those of the United States, and it must be expected to accelerate during the next 10 to 15 years.

To illustrate the kind of work they are doing, I will mention a few representative Soviet projects.

The Kuibyshev project on the Volga River has a plant with 2,100,000 kilowatts installed capacity, generated by 20 vertical Kaplan turbines with turbine rotors 30½ feet in diameter, operating under a normal head of 63 feet. By comparison, the 18 turbines at America's largest powerplant, Grand Coulee, on the Columbia River, a Bureau of Reclamation project, have a combined rated capacity of 1,944,000 kilowatts. The rated capacity of the Soviet generators is 105,000 kilowatts, as compared with 108,000 for Grand Coulee Dam.

Actually the American generators have been operated for long periods of time considerably above their rating, so it is quite possible that the American generators have a somewhat greater real capacity.

The turbines at Grand Coulee, a Bureau of Reclamation project, which has a 340-foot head, are of the Francis type and therefore are much smaller than the Russian turbines. The largest Kaplan type of turbines in the United States are those at The Dalles Dam on the Columbia River, which are 23⅓ feet in diameter.

Senator O'MAHONEY. What is a Kaplan turbine?

General ITSCHNER. A Kaplan turbine looks like a propeller. Actually, the blades can be rotated, as you feather the blades on an airplane propeller.

Senator O'MAHONEY. Where are they made?

General ITSCHNER. They are made by all of the American manufacturers, sir.

Senator O'MAHONEY. It is an American turbine?

General ITSCHNER. It is a type manufactured in America. A Francis turbine is much more complicated. That is the type where the blades are highly curved, there are many fixed blades, and it is designed to take care of higher heads than the Kaplan.

Senator O'MAHONEY. The Francis turbine is manufactured in what country?

General ITSCHNER. It is manufactured in this country, too, sir. I feel sure that all of these various types of turbines are manufactured in many countries, including Soviet Russia.

Senator O'MAHONEY. Do you know whether the turbines which are being used in Soviet Russia on projects like the Kuibyshev, are American turbines or similar to American turbines?

General ITSCHNER. They are definitely Soviet turbines, manufactured and designed by the Soviets, but they are very similar to American turbines. Many of them, however, are larger.

Senator O'MAHONEY. Are they efficient?

General ITSCHNER. We have every reason to presume they are, sir. We don't have any exact figures on their rated efficiency.

Senatory O'MAHONEY. Thank you.

General ITSCHNER. To continue, the Dalles turbines drive generators which are rated at 78,000 kilowatts under an 81-foot head.

Kuybyshev Dam is composed of earth dam sections located between powerplant and spillway, and between spillway and a bypass canal. These dams total 9,184 feet in length and have a maximum height of 164 feet.

Senator KERR. That refers to what dam?

General ITSCHNER. The Russian Kuybyshev, sir. By comparison, Fort Peck Dam, the largest in the United States, is 21,026 feet long and 250 feet high. The concrete spillway at Kuybyshev Dam is 3,280 feet long and has thirty-eight 65- by 33-foot vertical lift sluice gates handled by three 250-ton traveling cranes. It is designed to pass a flow of 1,312,000 cubic feet per second of water. By comparison, the Fort Peck spillway has a capacity of 250,000 cubic feet per secoond, regulated by 4 diversion tunnles and sixteen 40- by 25-foot gates.

The bypass canal at Kuybyshev Dam consists of two pairs of locks and an intermediate basin, plus appurtenant canals and basins upstream and downstream. The locks are 100 by 1,000 feet which com-

pares with the 110- by 1,200-foot size of the largest American barge locks. I cite these statistics to indicate that the Soviets are building works comparable to ours in all aspects.

Senator O'MAHONEY. What is the source of your statistics?

General ITSCHNER. The source, sir, is the large amount of intelligence information which we have accumulated in our Army Map Service.

It consists of practically every publication made by Soviet technological societies and other sources. It is very comprehensive. A good part of it is published by the Soviets themselves in Russian and is translated.

Senator O'MAHONEY. These figures are reliable figures, then?

General ITSCHNER. Yes, sir.

Senator O'MAHONEY. You accept them as representing an actual picture of what the Soviets are doing?

General ITSCHNER. Yes, sir; we do. They have all been checked from more than one source.

Some other interesting Soviet projects include four dams for their length—Dneprodzerzhinsk Dam, on the Dnepr River, over 12 miles long; Tsimlyanskaya Dam, on the Don River, 8.7 miles long; Gor'kiy Dam, 8.7 miles long, on the Volga River, and Kremenchug Dam, about 7 miles long, on the Dnepr River. These are all completed or under construction.

Two superpower dams, both well underway, are Krasnoyarsk Dam on the Yenisey River and Bratsk Dam on the Angara River. Krasnoyarsk Dam will be a concrete structure 2,300 feet long blocking a V-shaped mountain valley. It will have 4,004,000 kilowatts installed capacity—double the biggest American plant—and will include a vertical ship elevator which will lift vessels 370 feet upward to a metal trough.

Senator O'MAHONEY. When you say any American plant, you mean Government or private plant?

General ITSCHNER. Yes, sir, any American plant.

Senator KERR. How far is that dam from those you mentioned on the Dnieper River in terms of miles?

General ITSCHNER. It is a tremendous distance, sir. It is about 2,000 miles.

Senator KERR. Thank you.

General ITSCHNER. This trough will cross over a railroad line and open into the reservoir. Each of the generators at this dam will generate 286,000 kilowatts as compared to 108,000 kilowatts for the biggest American generators.

The Bratsk Dam is a 3-mile earth dam ending in a massive concrete spillway and powerplant in a deep rock gorge. The plant will have 3,840,000 kilowatts capacity, derived from eighteen 213,333-kilowatt generators.

One of the better known Soviet navigation projects is the Volga-Don Canal, which connects the Black and Caspian Sea Basins, and permits the Soviets to build submarines in large inland shipbuilding yards along the Volga River. This waterway was built between 1949 and 1952. From the Volga, a canal extends 63 miles westward to the upper end of a 160-mile-long reservoir on the Don River impounded by an earth dam nearly 9 miles long and about 150 feet high.

Power from the 160,000-kilowatt powerplant is used to pump water from the reservoir to the summit reach of the canal for operation of the locks. There are 13 locks, all modern and highly ornamented. The reservoir and powerplant also furnish water for the irrigation of nearly 5 million acres of semiarid land to the south.

Another noteworthy project is the 75-mile Moscow-Volga Canal, built during the 1930's. This canal has very large locks, 100 by 1,000 feet and 18 feet deep over the sills. In other words, they are almost as big as the locks now under construction on the Ohio River, but are deeper than our newest Ohio River locks which have 15 feet of water over the sills. The Moscow-Volga project also includes a 3-mile-long earth dam and a 30,000-kilowatt powerplant.

Pumping stations raise water from the reservoir to the summit reach of the canal, which also serves as a reservoir for the Moscow city water supply.

The project plan provides for pumped storage to help meet peak load conditions in the Moscow power grid, which is served mainly by thermal plants. Several of the project reservoirs have been developed for boating and bathing.

These examples will suffice to show the caliber of ingenuity and engineering which are being applied to Soviet water-resource development. I have two tables here which I would like to submit for incorporation into the record, with your permission, Mr. Chairman.

Senator O'MAHONEY. All of the exhibits that you submit will be placed in the record. They will be examined by the staff and inserted in the appropriate place for the purpose of maintaining continuity of your presentation.

General ITSCHNER. Thank you, Senator.

(The tables referred to appear in the appendix beginning on p. 202.)

General ITSCHNER. Table 1 shows the magnitude of construction work in 2 Soviet dams and 1 American dam. Table 2 compares certain major Soviet and American dams and powerplants.

Now I should like to summarize the Soviet accomplishments in certain specific fields of water resource development, beginning with hydroelectric power.

HYDROELECTRIC POWER

The total known capacity of Soviet hydroelectric plants over 10,000 kilowatts capacity, complete or under construction, is 25,883,188 kilowatts. This figure does not include 44 plants for which the capacities are not available to us.

Senator KERR. Would you venture any kind of an estimate as to their capacity?

General ITSCHNER. That would be very difficult, sir. We do know that the 44 plants are relatively small within the category I stated. In other words, they are over 10,000 kilowatts each, but they are not the larger plants. In addition, the Soviet Union has hundreds of small plants, built mainly to serve rural and agricultural needs.

By comparison, the total United States hydro capacity at the end of 1957 was 27,676,000 kilowatts, with approximately 10 million kilowatts more under construction. Thus, right now Soviet hydroelectric development appears to be roughly equal to ours in amount. However, their rate of increase is greater than ours.

The United States has no plants completed which reach the 2 million kilowatt mark, although John Day Dam on the Columbia River, on which construction will start this year, will ultimately have 2 million kilowatts if sufficient upstream storage is developed to make this amount of capacity economically justified.

Senator KERR. What will be the capacity of Hells Canyon Dam if built in accordance with the provisions of the bill now in the Congress?

General ITSCHNER. The at-site power at Hells Canyon, sir, I would like to ask Mr. Straus.

Mr. MAPES. There were several proposals discussed because of the need for additional peaking capacity, during the most recent hearings on the subject, one proposal being for an installed capacity of 1,250,000 kilowatts and the other proposal being for 1,500,000. The original plan called for 800,000 kilowatts initial and 900,000 ultimate.

General ITSCHNER. A great deal depends, sir, on the amount of storage that we can devlop upstream.

The John Day Dam will have initially 1,200,000 or 1,400,000 kilowatts. Grand Coulee Dam, also on the Columbia River, has 1,944,000 kilowatts of installed capacity in two powerhouses, plus 30,000 kilowatts by house units. Considerable study has been given to the construction of a third powerhouse which would increase the capacity to close to 3 million kilowatts. The combined Canadian-United States Barnhart Island powerplant on the St. Lawrence River, rapidly nearing the power-on-the-line date, will have 1,880,000 kilowatts of installed capacity, half of which goes to each country.

The new Niagara powerplant of the New York Power Authority, on which construction will commence this year, will have 2,190,000 kilowatts of installed capacity and thus will be, for some time at least, the largest United States hydroelectric plant.

But the U. S. S. R. has 10 plants ranging from 2 million to 6 million kilowatts, of which 1 is almost complete, 3 are under construction, and 6 are in planning or preparatory stages. One single plant, the Yenisey plant on the river of the same name, will have a capacity of about 6 million kilowatts, greater than the total capacity of all the powerplants at all the dams ever constructed by the Corps of Engineers, which now is 5,250,000 kilowatts.

Just five Siberian plants will have a combined capacity half again as great as the total hydro capacity of all Federal projects in the United States, taking the Corps of Engineers, the Bureau of Reclamation, and TVA together.

For detailed reference, I would like to submit for the record two more tables. Table III is a list of all known Soviet hydro plants of more than 10,000 kilowatts, and table IV is a list of all United States hydro plants over a quarter of a million kilowatts capacity.

Senator O'MAHONEY. The tables will be placed in the record at the appropriate place.

(The tables referred to appear in the appendix on pp. 204–212.)

General ITSCHNER. These Soviet achievements have been accomplished during a relatively short span of time, during which the construction program appears to have gathered a momentum which has not yet reached a peak. For instance, in 1956, hydroelectric power

capacity was increased by 2 million kilowatts, 3 times the amount placed in operation in 1955.

Senator KERR. Could you give us the amount by which hydroelectric capacity in this country was increased in 1956?

General ITSCHNER. I can get that figure, sir, and insert it into the record, if I may.

Senator KERR. Fine.

(The following information was subsequently submitted:)

Increase in hydroelectric generating capacity in 1956

	Kilowatts
Federal	835,116
Non-Federal (decrease)[1]	191,507
Gain	643,609

[1] Caused by failure of Niagara Mohawk plant, 334,800 kilowatts.

General ITSCHNER. By 1960, a 170 percent increase is planned over the total available in 1955. The memorandum of the chairman to members of the Senate Committee on Interior and Insular Affairs, dated December 20, 1957, has further material on this point.

A major feature of Soviet power development is the construction of a national transmission grid which will bring electricity, generated sometimes at remote hydro sites, to industrial centers of the U. S. S. R. The beginnings of this plan have already been accomplished in the recent completion of the 2-circuit, 400-kilowatt, 3-phase alternating current transmission line between the Kuybyshev powerplant and the Moscow industrial area.

One circuit is 506 miles long, the other 559 miles.

Senator KERR. Is it your judgment that transmission lines of that length will operate efficiently from the standpoint of minimum loss of power in transit and so forth?

General ITSCHNER. Yes, sir. There will be losses in power, of course, but with that high voltage, 400 kilovolts, which is greater than any voltage we use for transmission in the United States, the losses will be less.

Senator JACKSON. Is it 340 in the United States?

General ITSCHNER. 375,000 volts, sir; 340,000 volts is the common transmission voltage on the Bonneville Power Administration circuits, 375,000 is the voltage on the newer lines.

So far, United States power operators have had no need to build lines of this length and voltage. One noteworthy Soviet line now under construction will bring Stalingrad power to the Donbas industrial area, 300 miles to the west. This line will carry 800-kilovolt direct current to an inverter substation. Building this equipment required Soviet engineers to solve unprecedented electromechanical problems.

Senator O'MAHONEY. If that is the case, General, I assume that it is your opinion that the technical knowledge and efficiency of the Soviet engineers should not be underestimated.

General ITSCHNER. Yes, Mr. Chairman. They have shown a very great ability in designing transmission lines of this type. You see, the alternating-current type of transmission line is the only type that has been used in the United States for any distance. Now we see here a direct current type of transmission that reaches up to 800 kilovolts.

A great deal more electricity can go over an 800-kilovolt direct current line than can go over an 800-kilovolt alternating-current line.

Senator KERR. Do you think we would know how to do the same thing in this country?

General ITSCHNER. I am sure we can do it, sir, but we have not yet accomplished it.

I think it would take a good deal of time before we reach that stage of development.

Senator O'MAHONEY. At least, we should not be complacent about getting it started.

General ITSCHNER. No, sir. Of course, it will require a great deal of study and funds to achieve that accomplishment in this country.

About 70 percent of all Soviet power is used for industry. Most plants of 10,000 kilowatts or more are already on the growing national grid, and consequently it is difficult to determine just what industrial development is associated with any given hydroelectric development.

For example, more than half of Kuybyshev's power is being fed into the Moscow local network, which serves the Soviet Union's greatest concentration of industry.

The remainder is transmitted to Kuybyshev, Saratov, and the Urals to supplement the output of other power plants in serving the oil, steel and other industries.

The new plant at Irkutsk in Siberia, though only partly complete, is already serving a growing aluminum industry in central Siberia and is also providing power for electrified sections of the Trans-Siberian Railroad.

The Soviet achievement in hydroelectric power is of great economic and political value to the Soviet Union and the cause of world communism.

Soviet coal deposits are generally of poor quality and often must be hauled great distances by overburdened rail lines. Many of their thermal plants burn peat fuel.

Consequently, Soviet fuel costs are higher, and hydro powerplants are of even greater relative value to the economy than in the United States. Since the same situation is also true in many other parts of the world, the Soviet achievements are of great interest in such areas. These achievements are receiving great stress both in Soviet technical literature and in propaganda aimed at Asian and Middle Eastern countries. The engineering features are described in detail, and installations have been proudly shown to teams of visiting engineers from countries all over the world, including some from the United States.

Senator JACKSON. General, one source of assistance in connection with this enormous power output, of course, has been for their atomic-energy program. I think, Mr. Chairman, the figure may be classified, but let us put it this way: Our atomic-energy effort is taking a very substantial part, percentagewise, larger than any other industry, of our entire power output, including hydro and thermal. So the development of their hydro resources has given them a tremendous assist in connection with their atomic-energy activity. This is particularly true in the gaseous diffusion plants that require such enormous power.

Senator O'MAHONEY. To state it another way, the development of atomic energy depends upon electric power. Without an adequate source of electric power it would be impossible to develop atomic energy to the degree that a nation with large hydroelectric power could do the job.

Senator JACKSON. This is particularly true in the production of U-235. As far as plutonium is concerned, it does not take as much. But in the aggregate, the answer is clear.

Senator DWORSHAK. General, you have not given data concerning the cost of these power installations, either on a per-killowatt basis, or upon a dam or project basis. Do you have anything available?

General ITSCHNER. We have not been able to get very much valid information on the costs of projects because of the methods that they use in keeping their books. What we might get would not be very indicative of the real costs.

Senator DWORSHAK. When you make these comparisons, don't you think we ought to have some understanding as to the relative costs between power development in this country and in the Soviet Union? We need that as a basis to determine why they are making such progress as compared with our own. Do you not think that is very pertinent?

General ITSCHNER. I think it would be helpful to have the costs. We, as engineers, always express construction achievements in terms of price.

Senator DWORSHAK. Do you know how much it costs to install a kilowatt of power in a normal generating facility in this country?

General ITSCHNER. Yes, sir.

Senator DWORSHAK. What is it? About how much is it?

General ITSCHNER. The average coal plant——

Senator DWORSHAK. I am talking about hydroelectric. Well, go ahead.

General ITSCHNER. The average thermal plant would cost at this time about $150 per installed kilowatt. The hydro plants vary so greatly that it is difficult to take an average figure, but I will give you the extremes. The Chief Joseph Dam is about the cheapest power installation that has been built in recent years, and the cost of power per installed kilowatt at that project is slightly under $150 per installed kilowatt. That is exceptional. Costs go up from that amount to as much as perhaps even $1,000 per installed kilowatt. There are not very many at that price.

Senator DWORSHAK. What do you consider the efficient average cost which is feasible, and beyond which you do not think it is wise to make installations?

General ITSCHNER. The answer to the question is complicated by the fact that it depends upon how that power is to be used.

If the power is to be used for peaking purposes in a system, the owner can afford to pay much more for the powerw. Sometimes this power is used only 10, 15, or 20 percent of the time, for peaking purposes, and he can afford to pay more. I would say, though, that any hydropower today that costs above $400 per installed kilowatt should be looked at very carefully to be sure you can use it in a system.

Senator DWORSHAK. General, you have not made any reference to the aspect of handling fish migration on those streams. I am sure they have problems like that over in the Soviet Union, with streams

running into the great oceans, and the great inland bodies of water. Have you any data available on that subject?

General ITSCHNER. I have no data available on that subject, sir. From the information that we have been able to gather, they do not construct these very long, expensive fish ladders, such as we have on some of our projects in this country.

I think there are much better qualified experts here on that subject than I am who have actually seen some of these projects.

Senator DWORSHAK. The fishing industry, I am sure, is important to the Russian economy.

General ITSCHNER. Fishing on the Volga River is very important; yes, sir.

Senator DWORSHAK. Of course, in this country, it is true that some of the opposition on the part of the fish and wildlife interests to the building of dams, particularly in the northwestern section of our country, has been very articulate, and, in many respects, has been responsible for slowing it down, for slowing down this construction. Is that not true?

General ITSCHNER. I will say, to put it mildly, the opposition has been articulate and vocal.

Senator DWORSHAK. It has been effective, too; has it not?

General ITSCHNER. I don't think so, sir. I really don't know of a single project where the construction in accordance with a normal schedule has been delayed because of any opposition by the fish and wildlife interests. They have a very strong objection to certain projects on rivers having anadromous fish runs because of the problem of passing fingerlings downstream, as you know. We feel that we can get the adult fish upstream all right; that there is no problem there.

Senator DWORSHAK. You do believe, though, that in the Soviet Union they have made some progress in handling the fisheries migration and building these installations, or do you think that is completely ignored or obliterated as they plan in this power development?

General ITSCHNER. I cannot answer that question, sir. Perhaps I can find something on that. I shall do so. If the Chairman will permit, I will insert whatever I may find into the record.

Senator O'MAHONEY. That may be inserted.

Senator DWORSHAK. Thank you.

(The following information was subsequently submitted:)

The United States Fish and Wildlife Service states that the Soviets are up-to-date technically on the problem of passing fish over dams where runs of anadromous fish are affected. We know that provision for fish migration is provided for on one dam, namely, the Tsimlyansk Dam on the Don River. Providing such facilities on Volga River dams was discussed, but we doubt that they were constructed. A fish ladder at the Kuybyshev Dam on the Volga River was canceled. It is doubtftul if one is to be provided for the Stalingrad Dam on the Volga River.

DEVELOPMENT FOR WATER TRANSPORT

General ITSCHNER. Soviet achievements in inland waterway development are not as spectacular as in power, which for the time being has been given top priority, but are nevertheless noteworthy.

As of 1950, the Soviet Union had about 79,000 miles of navigable inland waterway, compared with 22,500 miles in the United States. However, a comparison of mileages alone is not very significant, for

many of their waterways are relatively undeveloped rivers and others are minor canals dating back to Tsarist times.

It appears probable that the Soviets have added no more mileage since 1917 than they have abandoned as obsolete. They have, however, done important work in modernizing and improving the navigability of some of the principal rivers and lakes.

Much of this work has been incidental to multiple-purpose projects. Because of the relative lack of development of the flood plains, the Soviets, instead of canalizing a river with a series of purely navigation pools, as we are doing on the Ohio, can build a series of larger reservoirs for power and other purposes.

Four important Soviet projects are primarily for navigation. One is the Stalin Canal, built by forced labor in 2 years, 1931–32. It provides a protected route between the Baltic and White Seas over which submarines and destroyers can pass from the North Atlantic to the Arctic Oceans, thus materially improving the operational flexibility of the Soviet Navy in those areas. This canal is 135 miles long and has 19 locks about 50 by 500 feet in size and 12½ feet deep. The navigation structures are of wood. Some of the dams provide power.

This waterway in turn is linked with the great Volga River by a 300-mile canal extending from near Moscow to Lake Onega. The locks are small and antiquated. The Soviets have undertaken a complete reconstruction job, and by 1965 plan to have a waterway with capacity equal to the Stalin Canal and the Volga-Don. When it is finished, the Soviets will have an inland waterway system linking the Black, the Caspian, the Baltic, and the Arctic, and capable of carrying smaller types of seagoing vessels, including submarines.

Senator JACKSON. So you can go from the Mediterranean to the Arctic, but not with a big ship.

General ITSCHNER. That is right, but you can with submarines.

Senator KERR. And smaller oceangoing vessels.

General ITSCHNER. That is correct, perhaps of 1,500 tons.

Senator KERR. And barges certainly as large as anything they want to build.

General ITSCHNER. Yes, sir.

Senator O'MAHONEY. Early in your testimony, General, I understood you to say that there were inland shipyards at which the Soviets are building submarines.

General ITSCHNER. That is correct, sir. They are on the Volga River, but I am not sure of the exact spot.

Senator O'MAHONEY. They are on the water route which runs, as was mentioned, from the Caspian and Black Seas to the White Sea, and which also affords water transportation to the Mediterranean.

General ITSCHNER. That is correct.

Senator O'MAHONEY. Are these submarines that the Soviets are building large submarines?

General ITSCHNER. I am sure, sir, that the largest submarines that they have built or are likely to build can go through the waterways.

Senator O'MAHONEY. In other words, these large submarines can be built in inland shipyards and transported without difficulty to the open sea?

General ITSCHNER. That is correct, sir.

Senator O'MAHONEY. Thank you.

General ITSCHNER. The other two projects are the Volga-Don Canal and the Moscow-Volga Canal, which I have already described.

It is the multiple-purpose projects which are transforming the inland navigation picture in the Soviet Union. They do this mainly by providing deeper channels, capable of carrying larger and more powerful craft on rivers where navigation already exists in relatively primative form.

On the Volga, a series of 12 dams, of which 8 are already complete or under construction, will provide a 10-foot or deeper channel over 2,000 miles of the main stream. Four more dams, of which 1 is complete, plus some dredging, will provide an additional 1,000 miles of 10-foot waterways on tributaries of the Volga.

On the Dnepr, 5 dams, all complete or under construction, will provide 680 miles of 10-foot channel on the main stream and 8 more dams, of which 1 is under way, will provide 1,600 more miles on tributaries.

On the Ob, a series of dams, of which one is virtually finished, will provide a 2,000 mile, 10-foot waterway on the main stream, and 12 more dams, of which 3 are under way, will add about 2,300 miles on tributaries reaching into China.

On the Yenisey, 5 dams, 1 under construction, will provide 1,800 miles on the main stream; and 7 more, 2 under way, will add 600 miles on the tributaries, at depths adequate for the largest river vessels and lake craft.

These are only a few of the main projects. They alone, when completed, will provide approximately double the mileage of 9-foot or better waterways that we have in the United States.

For comparison, the principal American inland waterways are the Ohio, 981 miles, now being modernized; the Tennessee, 652 miles; the upper Mississippi, 663 miles; the lower Mississippi, 964 miles; the Warrior-Tombigbee, 450 miles, now being modernized; the Missouri, 762 miles, now under construction; the Gulf intracoastal, 1,116 miles; and the Atlantic intracoastal, 1,262 miles. The latter two are 12 feet deep; all the others are 9 feet. In addition, construction is proceeding on the Arkansas, 525 miles, on which construction is just beginning, and the Columbia and Snake Rivers, 819 miles.

Table V describes the principal Soviet waterway development undertakings.

(Table V appears on p. 213 in the appendix.)

General ITSCHNER. At present the Soviet waterways do not handle nearly as much commerce as American waterways. In 1956, their inland waterway traffic in billions of short ton-miles totaled 48, and ours 220; their total tonnage in millions of short tons was 161.5, ours was 1,092.9. The important thing is the rate of growth. The United States since World War II has been undergoing a veritable renaissance of waterway traffic. Commerce has surged to the riverbanks in literally unprecedented volume.

Yet great as it has been, when expressed in percentages—which measure rate of growth rather than absolute volume—our increase in traffic has been dwarfed by the Soviet increase.

In the United States, 1956 total tonnage was 130 percent of 1950 tonnage, and 230 percent of 1928 tonnage. In the Soviet Union, the 1956 figure was 160 percent of 1950 and 440 percent of 1928. The dis-

parity is even greater when ton-mileages are considered. American ton-mileage in 1956 was 130 percent of 1950 and 200 percent of 1928; the comparable Soviet figures are 175 percent and 820 percent.

Obviously, the Soviets are only beginning to learn to use their waterways in the modern sense with which we Americans are familiar. It appears that they are just discovering the relative value of water transportation for handling bulk freight. During the fifth 5-year plan, 1950–55, when the total increase of shipments amounted to 52 percent, the shipments of coal more than doubled, ore increased 2.7 times, mineral construction material 2.7 times, and chemicals, 57 percent.

In the sixth 5-year plan, ending in 1960, this trend will be even more pronounced. Premier Bulganin has announced the goal as an 80 percent increase in tonnage, along with proportionate increases in waterway vessels. Z. A. Shashkov, the Soviet Minister of Inland Waterway Transportation, sets the target for coal shipments at double the 1955 figure; for oil shipments at 23 percent increase; for cement, double; for metals, 88 percent; for ore, 50 percent, and for salt, 42 percent. And he says that by 1960 the traffic—that is, the ton-mileage—on Soviet waterways will equal the American figure of 1955, excluding the Great Lakes.

Senator KERR. General, you have provided the committee with some small copies of that large map. I am sure that the Chairman would want that map made a part of the record.

Senator O'MAHONEY. It will be made a part of the record.

General ITSCHNER. I shall continue with my statement.

If they reach that goal it will represent a truly tremendous upsurge of traffic. Yet both their waterway construction effort and their provision of supplementary facilities indicates that their aim is deadly serious.

During the fifth 5-year plan their inland water fleet increased by 43 percent. This fleet is being modernized, with 19 out of the 22 types of self-propelled ships marked for construction in 1956–60 being diesel powered.

They are providing 1,800- and 3,000-ton barges, 5,000-ton self-propelled freighters, 3,000-ton tankers, and 2,200-horsepower tugboats. These craft are equipped with radar, echo-sounding equipment, and other modern navigational devices.

I might say a 2,200-horsepower tugboat is a very powerful tugboat, and is the equivalent of almost all of the newer and more powerful United States tugboats. Ports and artificial mooring places have been created on all the principal waterways, including walls, harbor booms, terminals, passenger terminals, and so forth.

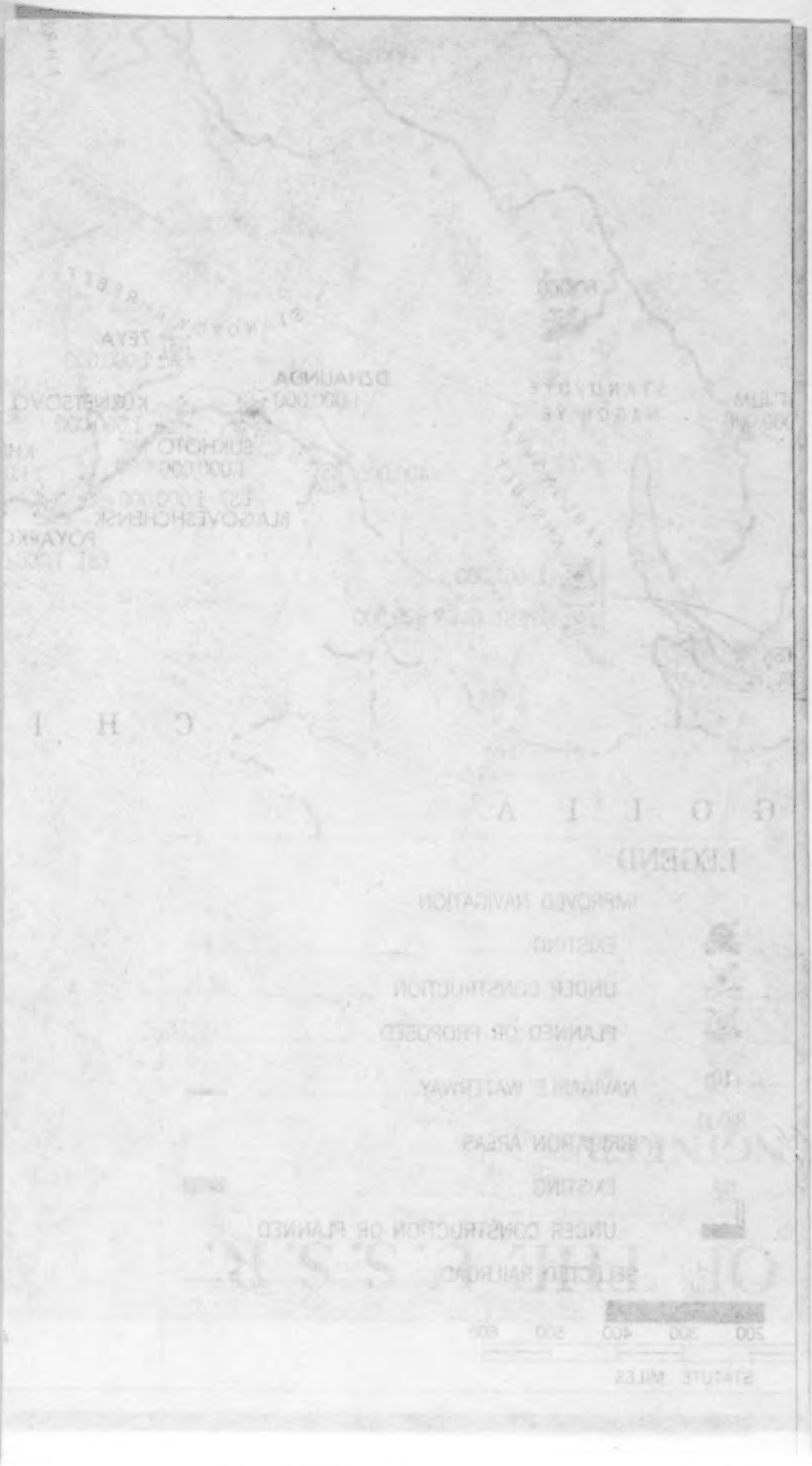
Cargo loading and unloading, which until fairly recently was done mainly by hand, is now being done increasingly by modern machinery.

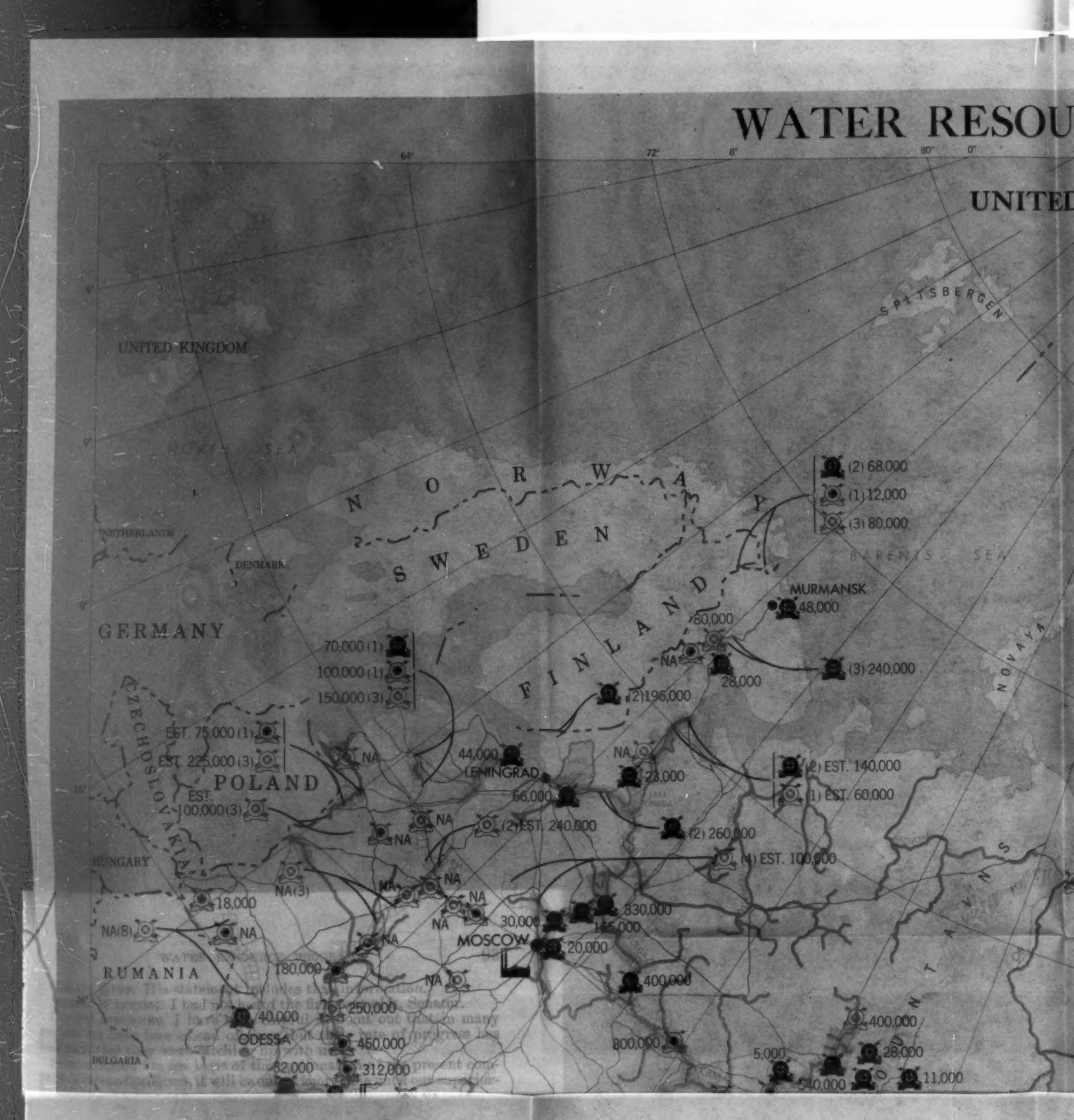
In the 1956–60 period 10 new river ports are to be built. In the United States, 3 harbors located on rivers are now under construction, survey reports on 2 unauthorized harbors are about complete, and 2 other studies have recently been authorized but not yet begun.

Senator WATKINS. Is that for comparison purposes?

General ITSCHNER. Yes, sir.

Senator WATKINS. That does not tell the story of what we have done previously. This is showing development in a recent time as compared with that in Russia.

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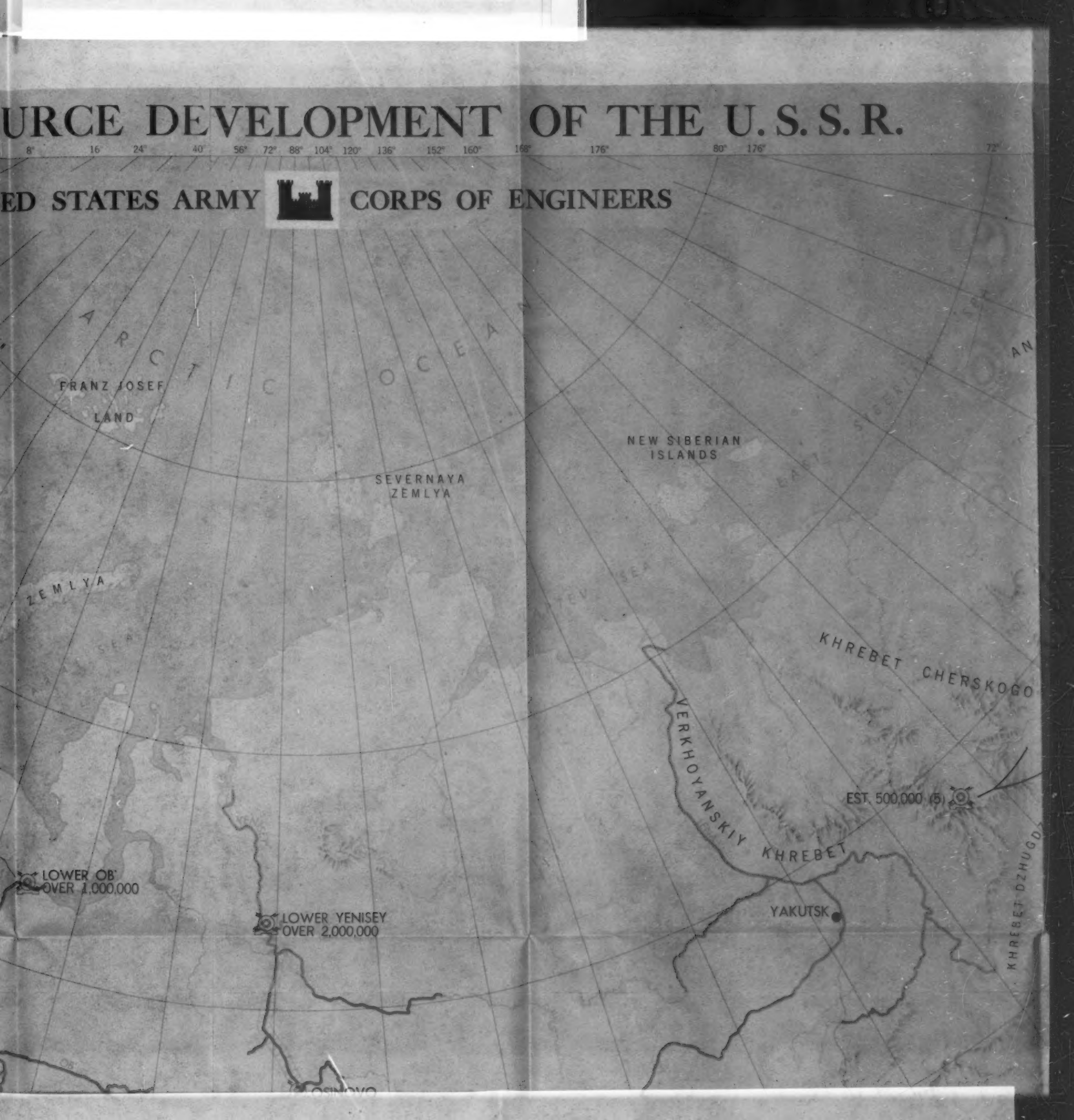

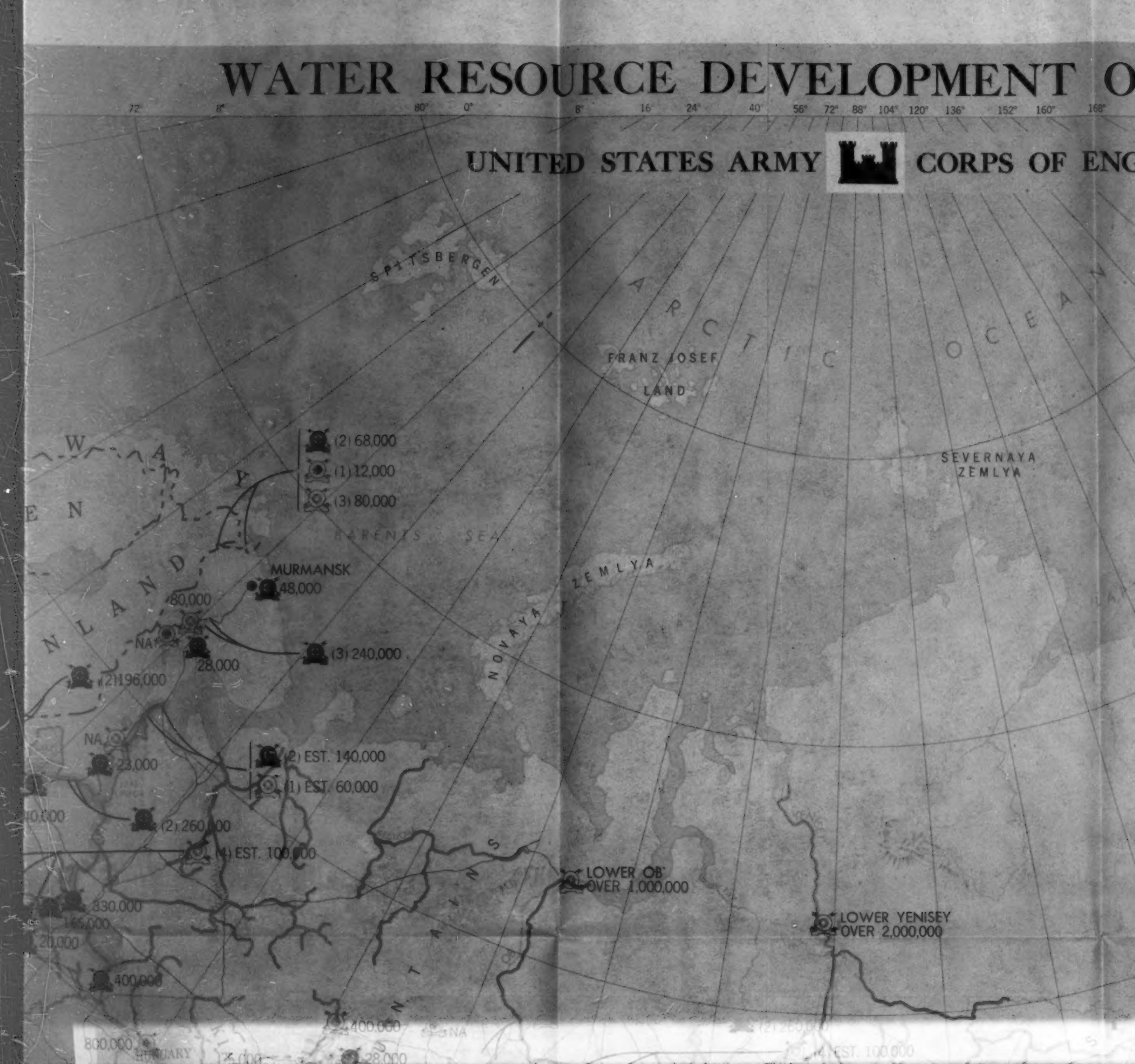
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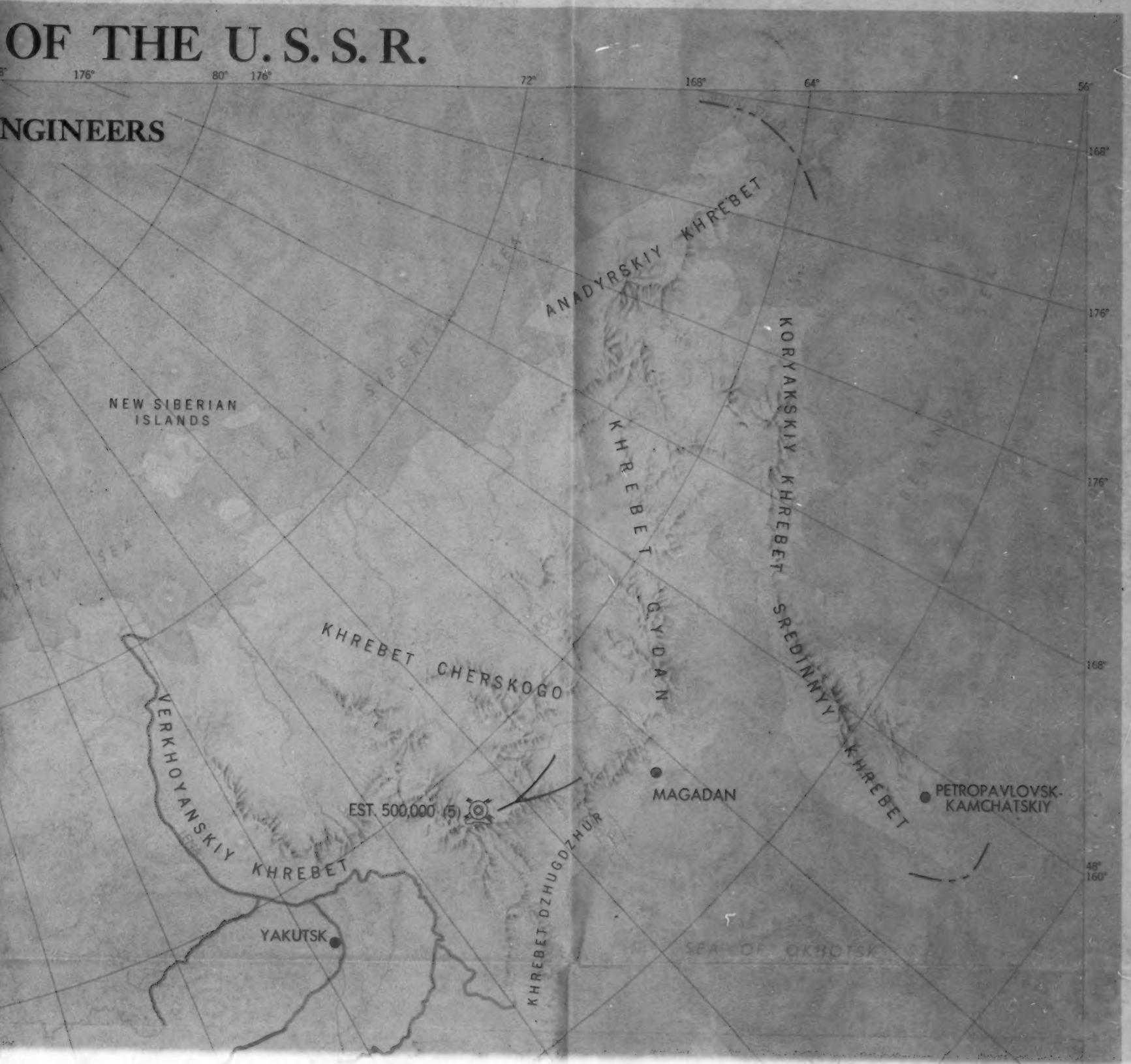

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PLANNED OR PROPOSED		PLANNED OR PROPOSED	
NUMBER OF PLANTS	(10)	NAVIGABLE WATERWAY	
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CAPACITY NOT AVAILABLE	NA	EXISTING	
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SELECTED ROAD		SELECTED RAILROAD	

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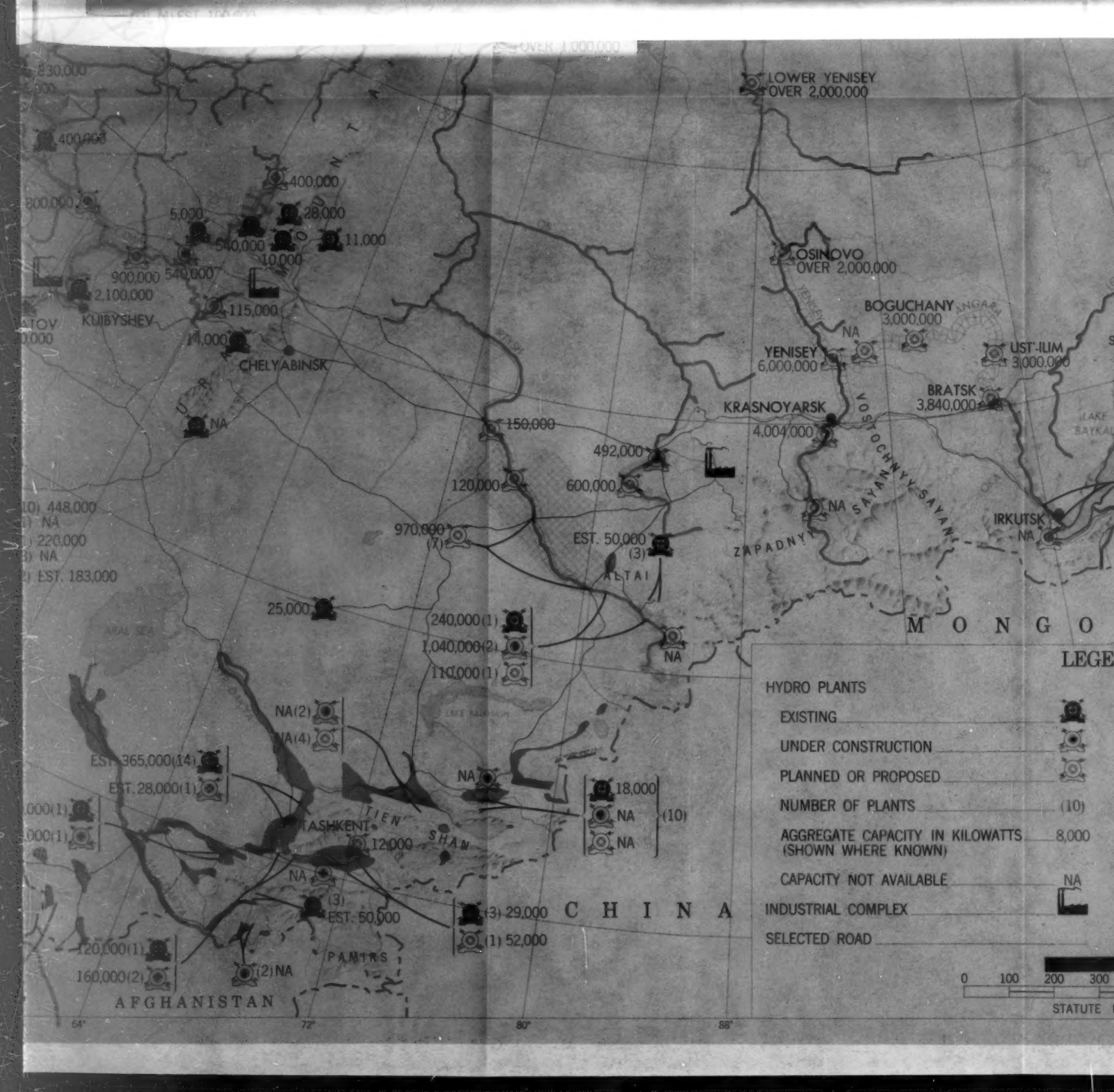
STATUTE MILES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CAPACITY NOT AVAILABLE NA
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PLANNED OR PROPOSED
NAVIGABLE WATERWAY
IRRIGATION AREAS
EXISTING
UNDER CONSTRUCTION OR PLANNED
SELECTED RAILROAD
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TE MILES

Senator KERR. His statement includes that information.

Senator WATKINS. I had not heard the first part of it, Senator.

General ITSCHNER. I have been careful to point out that in many respects we have been ahead of them, but their rate of progress has been such that they were catching up with us.

Senator KERR. On the basis of the continuation of the present comparable rates of progress, it will be only a short time until our superiority will be but a memory.

General ITSCHNER. I think that is a fair statement, sir.

Senator WATKINS. May I ask this question: Is that because we do not have enough places where we can make developments or is it because we have neglected to make developments we should have made?

General ITSCHNER. I think actually there are many reasons for the difference. We cannot take any one segment of our development and compare it with the Soviet segment and say that we should necessarily be ahead of them in each one. We should develop our water resources so as to serve this country in the best possible manner. I think, sir, if I go on a little further, I will cover that point a little more fully for you.

IRRIGATION

When it comes to irrigation, Soviet claims are more vague and less well substantiated than for power or inland water transport. For instance, the Soviets claim to have nearly trebled the area under irrigation in the U. S. S. R., but they provide no detailed information on where and when this irrigation took place. Furthermore, it is quite difficult to interpret the Soviet irrigation statistics.

I have a table—table VI—which duplicates material found in the December 20 report to the Interior and Insular Affairs Committee already referred to, but expresses it in acres rather than hectares. These data are in close accord with figures on the same subject available to Army engineer intelligence. The table shows Soviet irrigated acreages for selected years from 1913 to 1956.

(Table VI appears on p. 216 of the appendix.)

General ITSCHNER. During the period 1951 to 1955, inclusive, the area under irrigation in the U. S. S. R. appears to have increased by about 6 million acres, or 24.8 percent.

This compares with an increase in the United States during the same period of about 5,500,000 acres, or 21.6 percent. Much of the United States increase consists of sprinkler or other methods in areas outside the 17 Western States.

Senator WATKINS. You mean in areas where irrigation had not been practiced before, that they had now come to the conclusion that they could grow better and heavier crops if they did have irrigation, even though it is in a humid area?

General ITSCHNER. That is correct, sir, to supplement the natural water supply.

Senator WATKINS. The possibilities, of course, for irrigation in Russia compared to the possibilities here for future development, there is no comparison at all?

General ITSCHNER. There is no comparison at all. They have a great potential.

Senator WATKINS. In other words, they have not developed their potential as much as we have over here.

General ITSCHNER. They have not, sir. However, we may expect the rate of increase in the U. S. S. R. to accelerate considerably, for it is their practice to bring the irrigation portions of multiple-purpose projects along more slowly than other functions, and consequently the land reclamation benefits of some of their big undertakings are probably only now beginning to appear.

Some Soviet irrigation developments far outstrip the biggest American projects, at least as far as claimed acreage is concerned. One will provide water for 3½ million acres; another, for 4½ million; another, for almost 5 million; another, for almost 5½ million, and one in the South Ukraine is expected to make possible the irrigation of 8½ million acres.

Senator WATKINS. Is that area which has been cultivated before, but now they think they should add irrigation, or is this land which has never been under cultivation before?

General ITSCHNER. I think it is land, sir, with one exception, the section in South Ukraine, which, for the most part, was not under irrigation before, waste land. As for the one in the South Ukraine, I understand that is supplemental water for that land.

Mr. JAMES D. CATLIN (Army Map Service). It is submarginal land, and in years where rainfall is not sufficient, they plan to bring the water in to irrigate the area. It has not been irrigated before.

Senator O'MAHONEY. Mr. Straus, did you have a question?

Mr. STRAUS. To respond to Senators Watkins' question, these areas, particularly the Hungary Steppe area, have had some irrigation previously, on a much smaller acreage. The program now is irrigating a great deal more land, and also improving the irrigation on the land previously irrigated which has been irrigated in a small way for 50 or 60 years. The crop there, sir, is going to be primarily cotton.

Senator O'MAHONEY. Do you know whether part of this was dry land on which crops were not grown before the original irrigation was put in?

Mr. STRAUS. Yes, sir, that is correct. A great deal of it was dry land on which there was no horticulture prior to the original irrigation. That original is now being expanded and also new land added.

Senator O'MAHONEY. Do you have figures on the area of dry land which will be subject to water under the plans that the general is describing?

Mr. STRAUS. Yes, sir. We have those figures. They are very large acreages.

Senator O'MAHONEY. Will you put them in the record at this point?

Mr. STRAUS. I will.

(The information referred to is as follows:)

IRRIGATION IN SOVIET RUSSIA

The U. S. S. R. has a vast and accelerating irrigation program which, with the exception of the arid regions of the Mid-Asian Republics, is a form of river development subordinated to the prime objective of power production.

The Russian endeavor, on the basis of a dozen creditable reports, divergent as to arithmetic, but in basic agreement as to trend, appears to have far greater velocity than the U. S. irrigation program.

Using the best and identical set of (Russian) figures that both the Department of Agriculture (Foreign Agricultural Service) and the Department of State

(Division of Research and Analysis) offer independently as "authoritative" the U. S. S. R. nationwide total of "general area with irrigation networks" increased 12,594,000 acres in the 5 years from January 1, 1951, to January 1, 1956.

By another comparison the U. S. S. R. Council of Ministers' "directive" reported by the United Nations to all and sundry Soviet officials requires an increase of 5,187,000 newly irrigated acres in the next 5 years ending in 1960. The same authority simultaneously "directed" its servants in the same period to "bring into cultivation" 7,657,000 acres of land-drainage construction or reconstruction. The United States through the reclamation program his irrigated some 7 million acres in the 55 years since the Reclamation Act became law in 1902. In both countries the operation is essentially the same under Central Government auspices to aid the production of the same types of crops.

Mr. STRAUS. We also have to be submitted a report on irrigation by Mr. Horace Davis, whom Senator Ellender mentioned yesterday, the agricultural attaché for a number of years in Moscow. He is submitting a statement to the committee.

Senator O'MAHONEY. Thank you very much.

(The report referred to appear on p. 238 of the appendix.)

Senator ELLENDER. May I add to that, please?

Senator O'MAHONEY. Yes, Senator Ellender.

Senator ELLENDER. I visited Uzbekstan, Kazakhstan, Tashkent, and Kamchatka, where the cotton is being grown, which Mr. Straus refers to, and the water comes from the mountains in streams and the excess flows into the desert and evaporates. They are now in the process of building a canal 400 kilometers long and so as to utilize that water and use a lot of the virgin lands in that area.

A good deal of the land that was irrigated previously will be irrigated when this new canal is constructed. But I go back to the proposition that most of the land in that area that will be irrigated is new land, virgin land.

Senator JACKSON. Khrushchev has referred to it constantly as the opening of the so-called virgin lands.

Mr. STRAUS. It would appear from the literature that virgin land opening primarily means new irrigation.

Senator JACKSON. Irrigation and reclamation.

General ITSCHNER. Shall I proceed?

Senator O'MAHONEY. If you will.

General ITSCHNER. The biggest American projects cover about a million acres. However, there is a question as to whether the acreage figures provide an accurate comparison as to the amount of water made available.

The Soviets lay much stress on what we would call supplemental irrigation—that is, projects which provide only sufficient water to prevent crop failures in years of subnormal rainfall, and for supplementary watering in normal years.

Many such marginal subhumid areas are in the Caucasus Mountains and the southern part of European U. S. S. R.

Senator WATKINS. That would indicate they would be lands that they have already cultivated but they have not been successful because of a lack of water supply, but now they are going to be supplied with supplemental water.

General ITSCHNER. I am sure that is the point; yes, sir. In truly arid parts of the country, chiefly in Soviet central Asia, much effort has been devoted to extending and intensifying cultivation in previously developed irrigated areas.

Some Soviet irrigation projects have been delayed or deferred because specially developed construction equipment was needed elsewhere. Others have been abandoned or indefinitely postponed when it became apparent that not enough water would be available, under the planned river regimes, to serve the ambitious irrigation schemes. Though the navigational and reservoir features of the Volga-Don project were rushed to completion in 3 years ending in 1952, the main irrigational canals are not yet completed, and only a small part of the planned area is receiving water.

However, this appears to be due not so much to any undervaluation of the irrigation function, as to a desire to fit irrigation development into the general pattern of agricultural operations and development. Instead of providing large amounts of construction equipment on irrigation construction work, the Soviets have much of the work done by farm labor and machinery drawn from surrounding areas during offpeak employment periods.

I will complete this statement on irrigation by offering two more tables. Table VII shows the extent of Soviet irrigation by main geographic areas. Table VIII is a listing and brief description of some of the principal Soviet irrigation projects recently completed or under construction.

(The tables referred to appear on pp. 216–217 of the appendix.)

General ITSCHNER. Reviewing these evidences of Soviet water-resource development, certain conclusions come to mind. It is apparent that the Soviets are relying fundamentally upon such development to build up their economic and strategic capabilities and that the buildup of their economic capability is aimed squarely at worldwide economic competition with us.

However, this does not necessarily mean that to compete with them economically, we must duplicate their effort in every detail. We must consider our water resource development effort in terms of its part in our own overall economic strength and capability. Our economic and industrial system is in a different stage of development from theirs, it is growing along different lines, and it doubtless has different needs. Our resource programs should be aimed at meeting our own needs.

Nevertheless, we cannot overlook the evidences of Soviet technical capability, Soviet determination, and Soviet productive expansion revealed in their water-resource programs.

They help us estimate the scale of the effort which they are throwing into their competition with us. It is vast, and it is acquiring a tremendous momentum. This in my opinion is the principal meaning of the facts I have presented to you.

Senator JACKSON. Mr. Chairman?

Senator O'MAHONEY. Senator Jackson.

Senator JACKSON. I want to commend General Itschner and the Corps of Engineers for this excellent presentation of Soviet water-resource development. I think it is something that the American people should be more conversant with in realizing the nature of the competition that we face with the Soviets.

Senator DWORSHAK. General, I am sure there is no implication in your comments that there may be some superiority inherent in the communistic way of life which enables them to make such progress.

General ITSCHNER. No, sir; not by any means. I actually had a peculiar experience, a unique experience, of going into a Communist

country when it was captured from them. That was North Korea. I became convinced at that time that their way of life is much inferior to ours. But that does not mean we must not recognize their capabilities. I think that is also necessary.

Senator DWORSHAK. Their system seems to get results.

General ITSCHNER. They do get results.

Senator WATKINS. You do not have to debate with Congress and have long committee hearings and that sort of thing. When they decide on things, they can go to work right away on it.

General ITSCHNER. I do not think that is a factor, sir. I would like to say it was. But our processes are, actually, only a matter of a few months.

Senator WATKINS. We have been talking about some of these projects for many years, and we have not gotten them yet. We have a history here where it takes a long time in the democratic processes to get a project built.

By the time you get a majority of Congress in unison and get the executive department all in agreement, it takes a long time.

Senator O'MAHONEY. At this point, Senator Ellender wanted to complete his presentation.

STATEMENT OF ALLEN J. ELLENDER, UNITED STATES SENATOR FROM THE STATE OF LOUISIANA—Resumed

Senator ELLENDER. Mr. Chairman, with respect to the projects that I visited in Siberia and have discussed, I wish to point out to the committee that the project at Irkutsk when completed will have an installed capacity of 660,000 kilowatts, 8 turbines at 82,100 kilowatts each.

With respect to the facility at Krasnoyarsk, on the Yenisey River, a project General Itschner just referred to, there was some discussion as to whether this project would be built to a 4 million kilowatt plus capacity. However, I learned from an engineer at the head of a large steel plant at Novosibirsk, where turbines are being built, that the project at Krasnoyarsk will consist of 12 turbines, each with a capacity of 300,000 kilowatts.

Those turbines will be built at Novosibirsk, and provide for a total installation of 3,600,000 kilowatts. The dam at Bratskaya, which the general referred to, and about which I talked yesterday, will consist of 16 turbines with a capacity each of 200,000, or a total of 3,200,000 kilowatts for that particular project.

To summarize, these 3 projects at Irkutsk, Krasnoyarsk, and Bratskaya alone will produce 7,460,000 kilowatts, or a total of 65.5 billion kilowatt-hours per year. As I pointed out yesterday, the projects on the Volga, 8 in number, will have a total of 7,250,000 kilowatts or a total of 63½ billion kilowatt-hours per year.

Aside from the 8 projects that I described on the Volga River, there are 6 others, either planned or completed, on the tributaries of the Volga. On the Kama River, for instance, there is one dam planned. That will make a total on the Volga and its tributaries of 14 projects.

Mr. Chairman, I wish to further add that yesterday I made a statement that all projects are now financed by the Russians from their own treasury without the sale of bonds. That is a change that has

taken place in the last 2 or 3 years. As I stated yesterday, I questioned various sources on the financing question. As you may recall, the existing bonds were canceled by the Government, and now they obtain their construction funds direct from the treasury without the sale of bonds.

I wish to also say that I inquired about the make of these various turbines, and the ones principally in use are similar to ours, and the other which General Itschner described as the Kaplan design was developed in Austria, I was informed.

With that, Mr. Chairman, I shall be glad to appear at any future date that the committee may desire, if I am not tied up with my own committee, to answer any questions that may arise.

Senator O'MAHONEY. Senator, you have been most cooperative with the committee. I know I speak for all the members when I express my very great appreciation for what you have done. You have made a very remarkable trip that no other Member of Congress has made, throughout almost the length and breadth of Soviet Russia, both in Europe and in Asia, and you have brought back to us information of very great importance.

The detailed information given by General Itschner this morning verifies the statements that you made yesterday. I think there can be no disagreement that we have before us here in this committee the evidence of a Senator of the United States who has made this lengthy trip through Russia, and the testimony of the head of the Corps of Army Engineers, capably presented, very detailed, very clear, which demonstrates, I believe, that the United States cannot afford to be complacent about Soviet engineering gains as we were complacent about their gains in intercontinental missiles and in the work and the launching of the satellites. These are facts which we cannot escape.

I want to repeat what Senator Kerr and I both said this morning, from the Budget in Brief submitted by the Executive Office of the President for the fiscal year 1959. There appears on page 28, under the heading "Natural Resources," this statement, after a reference to expenditures prior to 1959:

> To avoid adding to these commitments at this time, no new project starts are proposed from the budget for 1959.

Senator KERR. If the chairman would like, I will call his attention to the message of the President on M–52 which said:

> We should not at this time add to this extremely high level of commitments by starting any new projects in 1959.

If the chairman would permit, I would like to put into the record at this point a statement on page M–51 of the President's budget, which I will mark, which has this language:

> This budget contemplates curtailing some programs and stretching out construction on other public-works projects, where this can be done without impairing the value of investments previously made—

and then it goes on to set out a kind of do-it-yourself proposal to the State and local groups, which, with the chairman's permission, I would like to include in the record.

Senator O'MAHONEY. This quotation from page M–51, of the message of the President, as set forth in the budget presented to the Congress, House Document No. 266, part 1, will be printed in the record at this point.

(Statement referred to follows:)

This budget contemplates curtailing some programs and stretching out construction on certain public-works projects where this can be done without impairing the value of investments previously made. At the same time, there will be necessary increases in expenditures for public works, because of the many commitments made for projects started in previous years. Total Federal expenditures for natural resources will increase $35 million over the current year.

These expenditures are estimated to be $1.5 billion in the fiscal year 1959, of which about $1 billion will be for the development of water resources.

There should be increased financial participation by State and local agencies and private interests in conservation and development programs. Such participation multiplies the effectiveness of Federal Government expenditures for these programs.

In particular, there should be a uniform and consistent basis for local sharing of the costs of all projects involving flood control which produce identifiable benefits to local groups.

STATEMENT OF E. C. ITSCHNER, MAJOR GENERAL, UNITED STATES ARMY, CHIEF OF ENGINEERS—Resumed

General ITSCHNER. I have a statement on water resource development in Communist China. It is not nearly as complete nor informative as the one on Soviet Russia, because our sources of information are not as good.

Senator O'MAHONEY. Are you willing to come back at 2 o'clock?

Senator KERR. I can finish with the general in the 10 minutes, as far as I am concerned, and he would not have to come back.

Senator O'MAHONEY. You may present your statement on China.

General ITSCHNER. Water resources are of utmost importance in China. Large numbers of Chinese farm arid and semiarid regions. Because of the high water requirements of paddy rice, the basic food, irrigation is mandatory throughout most of China.

Even the normally well-watered portions are subject to severe drought. Worse than the droughts are the periodic floods. Almost every year floods devastate thousands of square miles. Farmlands are eroded and impoverished; buildings, irrigation works, and crops are destroyed; communications and transportation facilities disrupted; and many lives lost. The problems of water control have plagued the overpopulated areas of China for centuries. These conditions, aggravated by years of war, constituted a definite challenge to the Communists when they ascended to power in 1949.

The Chinese Communists have put tremendous effort into water conservancy projects because they feel that through such development China's food problem will be solved. First, water-conservancy projects will increase food supplies. Second, the utilization of the vast underemployed manpower would provide great works while affording the peasants a living and helping to relieve, through constructive undertakings, some of the hostile and rebellious feelings brought about by the drastic social and economic changes in rural areas.

Third, an important byproduct would be hydroelectric power, much needed for the industrialization and strengthening of China. Finally, solving the age-old problem of water control would prove to the Chinese and to the world the right of the Communist government to rule.

Water-conservancy projects undertaken have ranged from individual village works to schemes to harness entire river basins. The

importance that the Chinese Communists place on such projects is difficult to overestimate and is reflected in the number of high-ranking governmental committees established for their supervision. During the first 5 years of communism, farm irrigation works which have been completed covered 10 million acres, and in addition 35 million acres of obsolescent works have been restored.

The 7 million additional acres planned to be irrigated in the following 2 years roughly equals the total acreage irrigated under the American Federal program in the 55 years since the establishment of the Bureau of Reclamation.

Other achievements attributed to the Communists during their first 5 years include the building and repairing of 26,000 miles of river dikes and 300 miles of sea dikes, the dredging of 3,750 miles of waterways, and the construction of a large number of reservoirs, water detention basins, dams, sluices, locks, and culverts along the Yangtze, Yellow, Huai, and other major rivers and their tributaries.

Involved in these projects was a total of approximately 3 million cubic yards of earthwork, 19 million cubic yards of stonework, and 700,000 cubic yards of concrete work. Irrigation projects included the construction of 8,400,000 canals (mostly small), ditches, ponds, and check dams, 900,000 wells and 600,000 water wheels.

Much of China's freight and passenger traffic moved over inland waterways. Because of the difficulty of maintaining navigable depths on the silt-laden rivers and canals, the very fact that existing facilities are kept operable is somewhat remarkable. Even more impressive is the fact that several thousands of kilometers of additional waterways have been opened.

During the pre-World War II period there were fewer than 10 significant hydroelectric plants and their combined capacity slightly exceeded 325,000 kilowatts. Since the coming of the Communists all existing facilities have been rehabilitated and 700,000 kilowatts of new hydroelectric capacity has been added.

While not impressive by American standards (Grand Coulee Dam alone, for example, has a capacity of nearly 2 million kilowatts), the power development is noteworthy in view of the lack of financial resources, lack of technical know-how, and the condition of the war-damaged facilities. On the other hand, irrigated acreages are extremely impressive.

Grand Coulee Reservoir was designed to irrigate a total of 1 million acres. The project was begun in 1934 and the dam completed in 1942. Some of the largest pumps ever built were installed. Yet no land was irrigated until 1952 when water was made available for 66,000 acres. Part of this delay is attributable to World War II.

However, more than 4 million acres were irrigated by China's Huai River project during the first 7 years of communism. Even when differences in terrain, water requirements, and objectives are considered, such a comparison emphasizes the magnitude of Chinese projects being carried out on the Huai, Yangtze, and many other rivers.

DEVELOPMENT OF HYDROELECTRIC POWER

Communist China is placing increasing emphasis on the development of waterpower potential despite the fact that their coal reserves rank third in the world. Recent estimates place the total waterpower

potential at approximately 540 million kilowatts; in contrast, that of the United States is only 84 million kilowatts.

There are several reasons for the emphasis on development of hydroelectric power. For one thing, although coal is found in nearly all provinces of China and output is constantly increasing, production had been unable to keep pace with demand, with the result that the Chinese economy has been plagued by a prolonged coal shortage.

For another, the lack of adequate transportation facilities has seriously hampered the delivery of coal to consumers. Again, hydroelectric plants are not only cheaper to operate but, in China, cheaper to build than comparable thermal plants—contrary to western experience.

When the first 5-year plan (1953–57) was announced, it was evident that primary interest was to be on the construction of thermal plants; however, reports received during the past 2 or 3 years indicate a definite shift toward hydroelectric development. Press reports and pronouncements by various Government officials have been stressing the advantages of hydro stations.

Although the plan was revised to reflect this change, actual development has been more rapid than planned. Hydroelectric generators now account for over 20 percent of the national capacity. Preliminary figures indicate that this trend will be accentuated during the next two 5-year plans. By the end of 1962, the percentage is to be increased to about 30 percent, and by 1967, to nearly 40 percent.

Four great river systems account for nearly 85 percent of the total undeveloped waterpower potential. The Yangtze system has about 40 percent, the Tibetan river systems have 20 percent, the southwest systems have 15 percent, and the Yellow River has 5 percent.

The largest two projects currently underway or in the advanced planning stage are on the latter stream. There is little indication that the Tibetan region will be extensively developed in the foreseeable future, while technical and financial problems have precluded development of the best portions of the Yangtze system. Many of the best sites are located in remote interior regions far removed from concentrations of population and industry.

There is, however, a trend toward development of industrial bases in some of these areas.

With considerable and much publicized aid from the Soviet Union and European satellites, Communist China now has 22 hydroelectric projects with capacities of 5,000 kilowatts or over which are completed, under construction, or in the final planning stages. These projects are listed in table IX.

(Table IX appears on p. 218 of the appendix.)

In addition, several hundred smaller plants have been or will be built to supply local areas. However, the trend is toward the development of large multipurpose projects for flood control, irrigation, and navigation as well as for power generation. Two projects of this type, with capacities of 1 million kilowatts or more, are to be completed on the Yellow River.

These plants will be used to supply power to new industrial complexes which are being constructed along the upper and middle reaches of the river. Five other hydroelectric plants with capacities of 100,000 to 1 million kilowatts are in various stages of completion or planning.

Two of these are located in Manchuria and will feed into the transmission system that interconnects the large industrial center in this area; a third will be connected to the transmission lines serving the lower Yangtze Valley; and the remaining two will serve cities in the southwestern part of the country.

Fifteen other installations of less than 100,000 kilowatts capacity are scattered throughout China.

Most Chinese dams are high-level gravity structures built of reinforced concrete; however, there is a recent trend toward earth-filled types similar to Fort Peck Dam on the Missouri River in the United States. A recently completed dam located northeast of Peiping is of this type.

DEVELOPMENT OF INLAND WATERWAYS

Communist China has a 75,000-mile navigable waterway network. Only about 7,000 miles can accommodate large river vessels; however, the remainder are extensively used by small native craft. For centuries these waterways have been the principal traffic arteries in the country.

The main rivers of China run east and west, and with their tributaries form extensive networks in the eastern half of China. They complement the railroads built in the recent past, which are generally oriented north and south. Though these railroads are able to provide a considerable amount of surface transportation, the rivers still carry the bulk of local trade. They are crowded with a tremendous number of small boats and there is serious congestion at the ports.

The principal waterway systems of China are the Yangtze System in the central part of China, the Hsi (Se) River in south China, and the Sungari in Manchuria. The Yangtze in 1957 carried 75 percent of the total river tonnage and is by all criteria China's most important waterway.

It is navigable for 1,500-ton vessels at certain seasons as far as Chungking, 1,500 miles inland. Improvements planned by the Chinese Communists will allow vessels of even greater draft to reach the city. Oceangoing vessels drawing 27 feet can reach the important inland port of Hankow during high-water periods.

A number of other important ports serving rich agricultural areas and important industrial centers have been developed along the Yangtze. The larger tributaries in the system have depths in their lower courses similar to those of the main stream.

In south China, the Hsi can be navigated for more than 200 miles inland to Wuchow by vessels drawing 13 feet. There are a number of navigable channels in the delta of this river. Significant tributaries, serving as important outlets for the interior, are located west of Wuchow.

The Sungari, a tributary of the Amur, carries the bulk of waterborne commerce in Manchuria. This river connects with the Soviet Amur system and is navigable by river steamers of 5-foot draft for nearly 600 miles. It serves some of the main agricultural areas and provides access to the leading industrial center of Harbin. The most important tributary of the Sungari is the Nonni.

The Grand Canal was constructed between the 5th century B. C. and the 13th century A. D. Its original purpose was to carry tribute from areas south of the Yangtze to the north of China.

However, because of the lack of maintenance and the advent of railroad transport, only the northern and southern sections of the canal are now in use. On these sections are 29 locks, mostly of the primitive inclined plane type which have no gates. These locks have a very restrictive effect on the vessels able to use this waterway.

Much of the improvement of navigable waterways has been incidental to flood prevention and irrigation projects. Dredging, usually with old, small-capacity equipment, is carried out on most navigable streams. Along several waterways, particularly the Yangtze, rocks and other obstructions have been removed and navigational aids have been added. Generally, the maintenance of navigable channels is carried out only as far as is necessary to keep them open.

Large-scale projects, such as the linking of major river systems or the development of new channels, have been discussed but are not being carried out at the present time.

A detailed description of some of the principal waterway projects is provided in table X.

(Table X appears on p. 219 of the appendix.)

IRRIGATION AND FLOOD CONTROL

General ITSCHNER. Prior to the advent of the Communist regime China had some 2 billion acres under irrigation, although many of the facilities had been rendered ineffective through lack of maintenance. During the first 2 years of Communist control the principal tasks of the water conservancy program were to repair old dikes and build new ones, erect numerous small dams, dig canals and drainage ditches, and promote local flood control and farm irrigation projects.

Though individual works were on a small scale, the total effect was very significant. This policy was revised early in 1952 and increasing attention was given to the construction of large river valley projects on a grand scale. The floods of 1954 gave additional impetus to the water conservancy program. Extensive water conservancy works have been undertaken in many parts of China.

Among these, a number of projects are outstanding for their magnitude and the vastness of the area they influence. Table XI lists 100 noteworthy Chinese flood control and irrigation projects.

(Table XI appears on p. 222 of the appendix.)

CONCLUSION

General ITSCHNER. Despite the limited scale of work now underway, it is apparent that the Chinese Communist regime has launched a serious and determined effort to develop the vast and long ignored resource potential of the country. The long-range consequences of this effort need no elaboration.

I have one other statement on the cost of power in the case of one project in U. S. S. R. which I thought might be of interest to the committee, and that pertains to the Krasnoyarsk project, on the Yenisey River.

The cost of installed capacity was $350 per kilowatt based on a value of 4 rubles equals $1. That compares, as I stated, with our cheapest project of $150 or a little less per installed kilowatt, and on up to several times the $350.

So that is about equal to the average figure for the cost of projects in the United States.

Mr. LINEWEAVER. What is the cost of production per kilowatt-hour?

General ITSCHNER. It is estimated at 0.185 cent for operating cost. To that should be added 0.0675 cent per kilowatt-hour for capital cost, or a total of a little over 2.5 mills.

Senator ELLENDER. That is what I gave as the cost yesterday on the Stalingrad, about 2½ mills.

Senator O'MAHONEY. Senator?

Senator KERR. I will ask the general if he would rather be questioned now or at 2 o'clock.

General ITSCHER. Either way, sir. I am entirely at your service.

Senator KERR. I am agreeable to doing it now or at that time, whichever is more convenient.

General ITSCHER. Whichever is more convenient to you, Senator.

Senator O'MAHONEY. Proceed.

Senator KERR. I want to congratulate the general on his comprehensive and enlightening statement, Mr. Chairman. He came to Oklahoma City on January 23 of this year, and made a statement on the challenge of the development of three resources by Soviet Russia.

I would like to read into the record a quotation that he made in that speech from Lenin, the architect of bolshevism, who said:

It would not matter a jot if three-fourths of the human race were destroyed. The important thing is that the surviving quarter should be Communists.

I gather from your statement here this morning, General, that you have a deep conviction that the Soviet challenge is on more than one front.

General ITSCHNER. I feel that the Soviet challenge on the economic front is just as serious as the military challenge.

Senator KERR. And, in fact, in that regard, you read the statement by Khrushchev which he made as a boast:

We declare war on the United States in peaceful production. We will win over the United States.

General ITSCHNER. That is correct, sir.

Senator KERR. I gather that your conviction, arrived at in part from that statement, is that one of the great challenges to this country, delivered to us thus boastfully and brusquely by the voice of the Soviet Union, is that we face, as a reality, their determined threat to win the cold war on the economic front as well as on the military front?

General ITSCHNER. I feel sure that they are determined to win such a war. Like most totalitarian states, we can expect that they will live up to their threats. They must do so if they expect to retain the support of their people.

Senator KERR. I want to congratulate you on that map, and the data which it discloses. Certainly it discloses that there has been a great deal of river improvement already, and that much more is being undertaken by the U. S. S. R. Would you make an estimate as to how much the Soviets have invested in this work?

General ITSCHNER. That is very difficult for us to estimate. We believe that it must be somewhere between 10 and 20 billion dollars.

Senator KERR. By comparison, what has the United States invested in the civil works program as conducted by the Corps of Engineers?

General ITSCHNER. We have invested in capital funds about $8.25 billion, sir. We have also invested about one-third that amount for maintenance and operation, for a total of about $11 billion.

Senator KERR. Over what period of years?

General ITSCHNER. That is since 1824.

Senator KERR. What part of that has been spent in the last decade?

General ITSCHNER. About one-half of that total, or something of the order of $5.5 billion, including maintenance and operation, has been spent in the last decade.

Senator KERR. General, you have been very helpful in many instances in providing committees of Congress with evidence of the value of water-resource development in the United States.

Would you give us a specific example of economic benefits accruing from one or more projects that you could refer to handily?

General ITSCHNER. Senator, I think one of the most remarkable developments in the United States has occurred since World War II along the Ohio River. Just flying over it in an airplane one is tremendously impressed with the large number of new factories, major factories, that have been constructed in that valley.

The reason is quite simple. They have water transportation, they have an abundance of water for industrial purposes, and they have access to the coal fields in the vicinity. I think the Ohio Valley alone, with its atomic energy plant development, as well as the normal industrial-commercial development, is ample evidence of the value of waterway improvements.

Senator KERR. The Ohio Valley has sometimes been called the Ruhr of America. Actually, how do the areas compare in the production of steel?

General ITSCHNER. I am sure that the Ohio Valley's productive capacity is greater now than that of the Ruhr, but I cannot give you a definite figure.

I will be glad to obtain that and insert it into the record.

(The following information was subsequently submitted by General Itschner:)

Comparison of the Ohio Valley with the Ruhr in steel production

	Tons
Pittsburgh-Youngstown area, United States:[1]	
Jan. 1, 1956	[2] 47, 328, 900
Ruhr Valley, Germany:	
April 1955 (approximately 41 percent)	[3] 19, 400, 000

[1] Statistics on steel production for the Pittsburgh-Youngstown area are essentially identical with the Ohio River Valley in terms of steel-plant production.
[2] As reported by the American Iron and Steel Institute.
[3] As reported by the European Coal and Steel Community.

Senator KERR. My information is that it is about three times as great.

General ITSCHNER. I would not be surprised if it is that great.

The Ruhr, incidentally, has been completely restored since World War II. It has been built up a great deal since World War II, or even compared to its maximum state of development prior to the war.

Senator KERR. The Ohio Valley and the area adjacent to it is also the scene of vast development in atomic power; is it not?

General ITSCHNER. That is correct, sir. It is often called Atom Valley by the people of that area.

Senator KERR. General, you know of my tremendous interest and that of Senator Ellender and many others in the Southwest.

Would you care to comment on the comparable opportunities there with the Ohio Valley?

General ITSCHNER. I think that the Southwest is a country that has a tremendous amount of undeveloped resources. There is a good deal of coal, a very large amount of coal, in parts of Arkansas and Oklahoma that is waiting for the opportunity to develop it, and that development can only occur by providing satisfactory water transportation.

Coal is a commodity which can be handled by the railroads and tremendous quantities are, but water transportation lends itself especially to bulk commodities, such as coal. I consider that the area you mentioned—Oklahoma, Texas, New Mexico, Arizona, and parts of Arkansas—being either semiarid or susceptible to prolonged droughts of great severity, needs water-resource development to supplement the already available supplies for industry, for agriculture, and for domestic purposes.

Senator KERR. You tell us that the corps spent $11 billion, or approximately that, since 1824.

Would you care to express an opinion as to what that has procured for our country and our economy in terms of economic results and economic development?

General ITSCHNER. In terms of the present-day dollar, we feel that the benefits from flood-control protection alone have been approximately $8⅔ billion, and the navigation benefits have been very great. Just exactly what they are, I am not prepared to say, but the total of flood control plus navigation must be several times the amount that has been spent, that is, $11 billion.

Senator KERR. That money has all been spent on projects authorized by the Congress, with reference to which there have been feasibility reports given to the Congress by the Corps of Engineers?

General ITSCHNER. That is correct, sir.

Senator KERR. Would you tell us what are the average years of service that this entire list of projects has given this country?

General ITSCHNER. We would estimate that the average life of all completed flood-control projects is only 12 years.

Senator KERR. In other words, you do not mean their average life, but you mean their average productive life up to now?

General ITSCHNER. That is correct, sir, their average productive life.

Senator KERR. And during that time they have returned to the country in the prevention of flood damage and the other assets they have created, a greater sum than their total cost?

General ITSCHNER. That is correct, sir.

Senator KERR. In the estimates you have submitted to the Congress, General, with reference to the economic feasibility of these projects, what would you say would be the average time forecast in the economic reports that it would take for the projects to pay for themselves in the prevention of flood damage and creation of other assets?

General ITSCHNER. Senator, as you know, we always evaluate our projects on a 50-year-economic-life basis. We realize that the actual lives of these projects are going to be much longer than that. We feel that by so doing we are being conservative.

I would estimate that the average benefit-cost ratio that we have used in our survey reports for all flood-control projects would be about 1.4 to 1. I realize that if these flood-control projects that we have already built have been effective in creating benefits of about $8⅔ billion as I stated, and with an average life of only 12 years——

Senator KERR. Do you mean the average effective life thus far?

General ITSCHNER. Yes, thus far, of 12 years. That is what I meant. And if the cost of these flood-control projects was only about $3.5 billion, we have already received in benefits 2½ times their cost, and that is in 12 years. So it would be fair to conclude that before those projects have reached the end of their useful life, the benefits would be many times their cost.

Probably a correct benefit-cost ratio, if you were to use that basis for computing, would be 10 or 12 to 1 during the assumed 50-year economic life of the project.

Senator KERR. In other words, if the entire program has, in effect, paid for itself in an average life of service of all of the projects in 12 years, the results of this work will be many times as beneficial as the estimates before the Congress at the time of the authorization of the projects?

General ITSCHNER. I think that we certainly can so conclude, sir, based on our experience thus far.

Senator KERR. As we go forward, and the population increases, and the use of these areas protected from flood is on a stepped-up basis, actually the economic value will increase—I do not know what the mathematical term is—at a far greater ratio than they would had the economic development and use factor in those areas remained what it was, which constituted the basis for the feasibility reports made by the Engineers to the Congress?

General ITSCHNER. That is certainly correct, sir.

Senator KERR. On that basis, and in the light of that information, what would be your summarized opinion of the relative U. S. S. R. and United States water-development programs?

Comment briefly on what it means to the United States to seriously and forthrightly, and constructively meet this challenge which they have given us and which they are giving us.

General ITSCHNER. As I indicated, our program cannot and should not be geared entirely to what is going on inside of Soviet Russia. The program for water-resource development that we have in our country must be tailored to meet our own specific needs.

We must face the fact that we are in direct military and direct economic competition with Russia. This competition is on a global scale, certainly. We think it is particularly pitched toward the uncommitted countries of the world, the countries on the fence or presently neutral.

We feel that the way these countries line up will have a good deal to do with determining the future balance of power in the world. To meet our military commitments is a tremendous task. To better our economic competition is difficult in the extreme.

We then have the third problem, which is a serious one, of providing for the 60 million additional people in the United States that we may expect to have in the next 15 or 20 years.

All told, with the three problems, we have a great demand for developing all of our natural resources, and water resources, of course, which are very important among them.

Senator KERR. Right there, General, would you care to comment on the water that is discharged by the Ohio River into the Mississippi River, I believe at Cairo, Ill., as to the possibility of the total volume having been through one or more sewage-disposal plants before it reaches that point in its journey to the sea?

General ITSCHNER. I think that the chances are very excellent that a good part of that water has gone through some disposal plant or use in an industrial plant.

Senator KERR. May be a considerable portion of it has gone through many of them?

General ITSCHNER. That might be. There is 1 tributary in Ohio, the Mahoning River, which, at Youngstown, Ohio, is very deficient in water compared to the use which is made of it, and that water, it has been computed, has gone through 8 different sewage plants or industrial uses. As a result, that water is raised so much in temperature in hot weather during the summer that a large part of its utility as a cooling medium for the steel plants in the Youngstown, Ohio, area is lost.

It is so bad that we now are claiming substantial benefits for one of our reserviors which we hope in due course to build, for the lowering of the temperature of that water. It is very important.

Senator O'MAHONEY. General, we appreciate your testimony. It has been very interesting.

Before we recess for the noon hour, I would like to announce that I have received a communication from Mr. Gus Norwood, executive secretary, Northwest Public Power Association, Inc., Vancouver, Wash. His letter contains several resolutions and an article entitled "A Consumer Power Policy." Mr. Norwood's communication and the enclosures will be published in the appendix to the record.

(The material referred to appears in the appendix beginning on p. 224.)

Senator O'MAHONEY. The subcommittee will now stand in recess until 2 o'clock this afternoon.

(Whereupon, at 1:20 p. m., Tuesday, February 18, 1958, the subcommittee recessed to reconvene at 2 p. m., the same day.)

AFTERNOON SESSION

Senator KERR. General, you were discussing the need for water conservation and the value of water conservation. Would you say that the finding of additional water supplies and the greater conservation of water might be one of the most critical problems that confronts us as we look forward to that 60 million additional people in the next 15 or 20 years with the resultant expansion of our economy?

General ITSCHNER. Yes, Senator, I feel the problem of providing sufficient water to take care of the additional people with their additional per capita consumption which we may expect together with

the vastly greater requirements of industry and agriculture constitutes one of the greatest problems in this country.

Senator KERR. It is a well-known fact that water is in acute short supply in many areas and becoming so in many additional areas at this times; is it not?

General ITSCHNER. Yes, sir. It is particularly acute west of the Mississippi except immediately alongside the Mississippi River. In some areas it is so acute that it has been a deterrent to the expansion of industry. Industry has had to locate where assured water supplies are available.

Senator KERR. You cannot procure, nor can you considerably increase the water supply by pushing a button like we are hoping to be able to do in connection with our defense, can you?

General ITSCHNER. No, sir; we cannot. If we were to start today and plan a large project, it would probably take close to 10 years before that project would actually be serving its intended purpose. Generally, the planning and the design stages take 2 or 3 years and then the period of construction is quite lengthy for a large dam project.

Senator KERR. You visualize two-thirds or slightly more than 50 percent of this additional 50 million people that you are looking for in 15 or 20 years might be here in 10 years?

General ITSCHNER. Yes, sir; that is correct.

Senator KERR. In other words, that is not going to be something that will wait until we get this additional water and then simultaneously occur?

General ITSCHNER. It will be too late if we wait for the people to arrive and the requirement for water is actually experienced. We must plan now and start construction now for the period 15 to 20 years from now when we will have a much greater demand.

Senator KERR. What would be your recommendation to the Congress as the voice of the agency that constructs and maintains water conservation facilities that come under your jurisdiction as to what you think should be done about this problem of water-resource conservation and development?

General ITSCHNER. I would like to make it plain, first, Senator Kerr, that I do not advocate a hurried, crash program. I think that would be wasteful. I also am quite cognizant of the many and varied requirements for funds within our Federal budget, including the very substantial outlay that is going to be required for the development of weapons.

However, I think that we must immediately evaluate the national water requirements as determined by a realistic appraisal of our long-range needs. Then, after making that study, I think we should initiate an orderly and sensible construction program and prosecute it at the maximum rate consistent with its importance.

Senator KERR. And in determining the specifications of this program, do you feel that we have a great compulsion to do so on a basis that will meet the requirements of our population as it will increase both from the increased number of human units we will have as our population increases, as it very definitely will?

General ITSCHNER. I think that those two factors are very important—both the increase in the population and the increase in per capita

consumption of water to which must be added the very substantial amounts of water that will be required for irrigation and industry.

Senator KERR. You heard the observation here referring to the figure in the 1959 budget from the President for water-resource development which I believe was $1.5 billion. That is for all of the water resource development programs and maintenance, is it not?

General ITSCHNER. That is correct.

Senator KERR. That is not the amount that is being referred to as being the amount for the Corps of Engineers?

General ITSCHNER. No, sir.

Senator KERR. That recommendation is for the entire resource-development program for all of the agencies of the Government, is it not?

General ITSCHNER. Yes, sir; I believe that is correct.

Senator WATKINS. Including projects for agriculture?

General ITSCHNER. I am sure it includes the program for the soil-conservation development.

Senator WATKINS. On the small projects that agriculture has?

General ITSCHNER. Yes, sir; that is included in that.

Senator KERR. Public Law 566 and other water-conservation projects operated by the Department of Agriculture?

General ITSCHNER. Yes, sir.

Senator KERR. Are you familiar with the expansion program of the American Telephone & Telegraph Co. for 1958?

General ITSCHNER. I have not paid too much attention to that program. I have heard that it is a vary large expansion program, something over a billion dollars.

Senator KERR. Would you be surprised to hear that it is over $2 billion?

General ITSCHNER. I am a little surprised, although I knew it was great.

Senator KERR. Does it occur to you as quite significant that American Telephone & Telegraph, which has been expanding at the rate of a billion dollars or $2 billion a year, and has an expansion program for 1958 of $2 billion, is only one of many American corporations that has an expansion program for 1958 of from $1 to $2 billion each, and that at the same time the program of expansion of resource development of the United States Government is considerably less than that of more than one individual American corporate entity.

General ITSCHNER. As I said, I knew the American Telephone & Telegraph Co. did have a very large expansion program. I did not realize it was quite that great nor did I realize that other American corporations have in excess of a billion dollars for their expansion programs for this current year.

Senator KERR. It would seem that if individual corporations felt that, in order to serve that segment of the population which they serve or seek to serve, they, even with the present condition of tight credit and high interest rates, have a compulsion to move forward at such rates that maybe the United States Government serving all of the 173 or more million people might do well to reevaluate the rate at which we move forward in the development of our natural resources, our soil, and our water programs.

General ITSCHNER. I think it is very important that the United States Government move forward paralleling industry. The mere fact that we are going to have a much larger population in 15 or 20

years means that we must develop our resources to take care of them and among those are water resources which I think are extremely important, particularly insofar as some parts of the country are concerned.

Senator KERR. I believe you said you knew of no more important economic program than the expanded development of our water resources.

General ITSCHNER. I think that is true. Its benefits are permanent and great.

Senator KERR. And the requirement is increasing in substantial quantities annually?

General ITSCHNER. That is correct, sir.

Senator JACKSON. I think it would be good to have for the record the increase in water requirements per capita and the incerase in power requirements per capita in this country. It is moving along at a rather substantial rate as I recall. The requirements for water alone to support industry is terriffic. The power requirements to support industry in the American household is going up almost on a geometrical progression basis.

I think it would be helpful to have that, so that we can have it in perspective, because we cannot assume that our power requirements are going to be the same in the future as they are today.

Senator KERR. I would be glad for you, general, to insert in the record the information you have with respect to the increase per capita for water in each of the last five decades; also, a table showing the increased power consumption.

I understand that in 1957 the power consumption in the United States was at least 16 times what it was in 1920.

General ITSCHNER. I certainly agree that it is in that range.

Senator KERR. I would be glad to have you submit the accurate figures on that and also I have had testimony from the Public Service Corp. and the Oklahoma Gas & Electric Cos., two great utilities serving Oklahoma, that their load factor has doubled each 7 years, and that they expect a continuation of that rate of growth.

If they are accurate in that and the requirements do double each 8 years, let us say, then in 32 years this country would require 16 times as much electric power as we consumed last year.

Would that not be the mathematical calculation of that sort of geometrical progression?

General ITSCHNER. Yes, sir. Actually, I believe the average increase in some parts of the country has not been as great as it has been in Oklahoma. The Pacific Northwest uses a figures of something like 7 percent a year, which means in 14 years——

Senator KERR. If it is 7 percent a year it does not take 14 years for that to be 100 because that is compounded, is it not?

General ITSCHNER. It is compounded, that is right. It would not take quite 14 years.

Senator KERR. I was quite impressed with the comprehensive statement which the senior Senator from Louisiana, Senator Ellender, made in his remarks concerning his trip through Russia and the Army engineers statement. I refer particularly to this statement:

> I note that the budget submitted by the President for 1959 was only $627,670. In my preliminary review of the justification sheets for this year, it is again evident that completion dates on most of the projects will be extended an ad-

ditional year or two. I realize that, as a result of pressures by the administration to hold down expenditures, together with the restriction on incurring new obligations, it will be almost impossible to keep on the schedules submitted last year.

It appears, however, that if we started now to efficiently use available funds, an appropriation for this program of about $800 million in 1959 would provide an adequate resource development program in the next fiscal year.

General, if we were to decide that we should complete all of the projects now under construction in accordance with the program and schedules which you submitted to the Senate Appropriations Committee last year as submitted and as developed under the questions asked you by the committee, would your judgment be that a figure of $800 million in fiscal year 1959 is a reasonable estimate of the amount required to maintain that schedule?

General ITSCHNER. Yes, sir. I think if we were to maintain the schedules that we gave to the committees of both Houses last year, we would require for fiscal year 1959 about $800 million.

I think that is as reasonable an estimate as we could make.

Senator WATKINS. You are talking about only the Corps of Engineers' activities?

General ITSCHNER. Yes, sir.

Senator KERR. Reference has been made to increased expenditures for public works in fiscal year 1959. I note that the budget request for funds is less for 1959 than the appropriations for fiscal 1958.

Would I be justified in concluding that part of the funds now scheduled for expenditure in fiscal 1959 are to come by reason of the directive of June 28, 1957, wherein the President requested all agencies of the executive branch to keep the rates of commitments, obligations and expenditures for fiscal 1958 at or below the level for fiscal year 1957 to the extent feasible?

General ITSCHNER. Sir, the statement that the amount that is included in the President's budget for fiscal year 1959 is less than the amount in his budget or the amount appropriated for fiscal year 1958 is correct. It is several million dollars less.

If we were to keep on at the same rate of progress, we would have to retain some of the unexpended funds that we have at the end of this year. We are going to have a rather large amount of such funds at the end of this year based upon current progress, because we have made a very conscious effort to slow down projects as much as we can.

For instance, we are going to start all of the fiscal year 1958 new starts so late in this fiscal year that we consume, say, not over $50,000 or $100,000 per project rather than starting earlier and, by that method, consume a great deal more money. So I do feel we will have much more left over at the end of this fiscal year.

Senator KERR. That is as the result of your complying with the directive of the Budget Bureau to spend less during fiscal 1958 than was appropriated by the Congress to be spent in fiscal 1958?

General ITSCHNER. The directive was not in those words. It was to slow down projects as much as we can and still make all of our new starts in the fiscal year.

Senator KERR. Then the amount that you will have left will be, by reason by the fact that you have complied with that request rather than operated on the program in the manner contemplated by the Congress when it appropriated the money for fiscal 1958, is it not?

General ITSCHNER. The amount that we will have left over will be greater than it would have been if we spent the amount that the Congress had appropriated.

Senator KERR. And the amount—I am not trying to push this. I am just trying to definitely locate the responsibility for the fact that the money has not been spent or obligated.

General ITSCHNER. The reason it has not been spent nor obligated is because of the instructions we have had to slow down.

Senator KERR. The instructions from the Budget Bureau?

General ITSCHNER. Yes, sir.

Senator KERR. General, I am certainly grateful to you.

I have been requested to ask you in submitting the data on increase in the per capita consumption of water thus far, to also include a forecast of what the increase will be in the next four decades, both as to domestic and industrial and agricultural uses, and generally, and to the extent that it can be done without any real burden on your staff, the geographical areas in which the water generally will be required.

(The following tables were subsequently submitted:)

Consumption of electric power in United States

Year:	*Kilowatt-hours per capita per annum*	Forecast:	*Kilowatt-hours per capita per annum*
1902 [1]	76	1960 [2]	4,880
1912	260	1970 [2]	6,640
1920	532	1980 [3]	7,780
1930	930	1990 [3]	8,900
1940	1,360	2000 [3]	9,920
1950	2,570		

[1] 1902 through 1950, Historical Statistics of the United States, Department of Commerce.
[2] Federal Power Commission and Bureau of Census.
[3] Estimates, Corps of Engineers, based on information, Bureau of Census.

Consumption of electric power in U. S. S. R.

Year	Kilowatt-hours per capita per annum
1921	3
1931	63
1940	[1] 254
1951	564
1956	963
1958	[2] 1,075

Forecast [3]	1 percent per annum rate of increase in rate of production of new capacity	2 percent per annum rate of increase in rate of production of new capacity
1916	[4] 1,523	[4] 1,523
1971	2,732	[5] 2,920
1981	3,600	4,100
1991	4,200	5,086
2001	4,523	5,637

[1] Data for 1941 is not available, nor would it be valid because of World War II destruction.
[2] Soviet plan for 1958 (New York Times, Dec. 20, 1957).
[3] Projection of future per capita use of electric power in the U. S. S. R. is based on current Soviet planning to 1972. Beyond this date, the forecasts are conjectural.
[4] Based on U. S. S. R. 6th 5-year plan goal of 320 billion kilowatt-hours consumption in 1960.
[5] 3,080 to 3,460 kilowatt-hours per capita in 1972. Based on Nikita Khrushchev's speech of Aug. 10, 1957, of 800 to 900 billion kilowatt-hours total consumption for 1972 (New York Times, Aug. 11, 1957).

Consumption of electric power in U. S. S. R. (for 1955)

	Percent
Industry	65.8
Domestic Needs (urban)	16.7
Transportation (not municipal)	3.2
Agriculture	2.0
Powerplants (for own use)	6.3
Transmission line and other losses	6.0
Total	100.0

Per capita water use in United States

	United States population	Daily average per capita water use (gallons)			
		Industrial	Agricultural	Domestic	Total
1900	75,994,575	197	266	66	529
1910	91,972,266	223	424	75	722
1920	105,710,620	265	529	79	874
1930	122,775,046	321	490	89	900
1940	131,669,275	389	539	100	1,029
1950	150,697,361	560	664	124	1,348
1960	176,100,000	849	766	159	1,774
1970	196,300,000	1,074	810	177	2,061
1975	206,600,000	1,193	821	179	2,193

NOTE.—Computed from data presented in Department of Commerce Bulletin BSB-136 dated January 1956.

Estimated consumption of water in U. S. S. R.[1]

Year:	Gallons per day per person
1913	[2] 4.3
1926	4.7
1940	6.1
1950	([3])
1960	8.3
1970	8.0
1980	8.6

[1] Domestic consumption only: no known statistics available for industrial and irrigation purposes.
[2] Low water use is because of low standard of living and general lack of plumbing units.
[3] Not available.

Senator KERR. I think you have rendered a tremendous service in getting us this information about the development of water program in the Soviet Union. To the extent that it is appropriate, would you tell the committee how you were able to do that?

General ITSCHNER. This information was largely prepared by the the staff of the Army Map Service. The Army Map Service has two functions—the preparation of topographical and strategic maps for all of the military services and the State Department and so on, world-wide, and a second function of accumulating engineer intelligence throughout the world.

By that I mean information on topography, industry and engineering construction materials and methods and so on, and the Army Map Service has accumulated this information as part of their routine work. It was just a matter of assembling it for this presentation.

They obtained a good deal of their information from such sources as foreign periodicals and publications, and books which they translated. The Russians have been rather free, in fact they have been anxious to disemminate throughout the world the information about their technological advances and construction achievements so there

has been no problem in getting the information that is required for an analysis of this type.

Senator KERR. It is your feeling and conviction and judgment that the gathering and analyzing and presenting of this information, having it available not only to our Defense Department but to the Congress, is quite necessary to enable all of us to know what the strength of actual or possible enemy countries might be in the economic field as well as the military field and thereby informed as to what we should do to be able to insure our own own survival and appropriate objectives of progress in order to maintain our own position for ourselves and in comparison with them.

General ITSCHNER. Yes, sir; I think that summarizes the problem and what must be done very succinctly.

Senator KERR. Thank you very much, General.

Senator JACKSON. With respect to the information requested by Senator Kerr, I wonder if you might have information available as to Soviet per capita consumption. It is my recollection, of course, that the real significance of your presentation lies in the fact that the Soviets do not have the luxuries that we have, that they can use more of their power for stated national objectives, either military or for economic warfare.

General ITSCHNER. That is certainly true.

Senator JACKSON. In other words, the Soviet gross national product is about, I believe, $133 billion, at an annual rate. Ours is at an annual rate of $438 billion. It may be down a little bit, but it does not follow that we are three times as strong in those military areas, because they are using a greater percentage of their gross national product than we are for military purposes.

The other observation I wanted to make is: The President of the New York Stock Exchange last night stated that, in order to meet the growth requirements of this country, American industry would have to increase its annual capital expenditures, which Senator Kerr referred to in connection with just 1 company, American Telephone & Telegraph, from an annual rate of last year of $37 billion to $45 billion a year. If industry is going to achieve this objective, then it would seem that water-resource development in its many areas or categories could and would be necessary to provide the kind of support necessary to achieve that stated objective. I think you heard the same speech.

Senator KERR. Yes; and I have one more question.

General ITSCHNER. I believe that, if the water-resource development does not keep pace with the expansion of industry, expansion of industry cannot continue.

Senator JACKSON. This is true in power and water. I think the American public fails to realize that water is indispensable for the steel industry, the paper industry, and a multitude of other industries, the oil industry.

Senator KERR. General, there were some statements and observations here about some new starts. How many new starts has the Corps of Engineers recommended in the last 5 years of multiple-purpose projects which would be built entirely at the cost of the United States Government?

General ITSCHNER. That is, recommended for appropriation for construction? Is that what you mean, or do you mean for authorization?

Senator KERR. Either or both. How many new starts of multiple-purpose projects to be paid for entirely by the Federal Government have been recommended for beginning of construction by the Corps of Engineers in the last 5 years?

General ITSCHNER. I know of one, and that is Hartwell Dam on the Savannah River.

Senator KERR. Was that a multipurpose project?

General ITSCHNER. It does have power. It also is for flood control.

Senator KERR. How many other multiple-purpose projects are there, with power?

General ITSCHNER. I do not believe there have been any others. Also, I was mistaken about Hartwell Dam. It was added to the appropriation bill by the Senate.

Senator KERR. I asked how many new starts of multiple-purpose projects have been recommended by the Bureau of the Budget or the Corps of Engineers, to be started for construction in this country in 5 years?

General ITSCHNER. I think the answer is "None."

Senator WATKINS. You had not recommended any?

General ITSCHNER. We did not recommend any to Congress.

Senator KERR. If any have been started, it has been by the Congress over the adverse recommendations of the Corps of Engineers, speaking in accordance with the directions of the Bureau of the Budget.

General ITSCHNER. If any have been started, and there have been some started, the starting of those projects has been because they have been added by the Congress.

Senator JACKSON. The largest single one is the John Day Dam that we approved last year, and another one is Ice Harbor.

Senator WATKINS. Was the John Day Dam to be built entirely at United States expense?

General ITSCHNER. Yes, sir.

Senator JACKSON. I think the followup question might be: How many did you recommend to the Bureau of the Budget or that you recommended out of your Department through channels which were turned down? If you do not have the figure now, could you supply it?

General ITSCHNER. That is a difficult question to answer, because I am not sure what the criteria were that we had to comply with.

Senator JACKSON. The trouble is that you have certain criteria that you must follow, which precludes you from making recommendations that you might make if you did not have what you call your policy decisions.

General ITSCHNER. They are usually called budget criteria.

Senator JACKSON. If you can supply it, and make it clear under what criteria that you made those recommendations and what the recommendations were, or, if there were no limitations, did you make the recommendations entirely on your own criteria that you usually follow?

(The following information was subsequently submitted:)

Federal power projects commenced since fiscal year 1953

Year and name of project	Installed capacity (kilowatts)
1956—Dardanelle	120,000
Fort Gaines	130,000
Hartwell	264,000
Eufala	90,000
Cougar	25,000
Hills Creek	30,000
McGee Bend	45,000
Ice Harbor	270,000
1957—Greers Ferry	96,000
Lower Cumberland	130,000
Fort Peck	[1] 80,000
1958—John Day	1,200,000
Bull Shoals	[2] 80,000

[1] 2d plant.
[2] Units 5 and 6.

Power projects authorized since 1950 by the Rivers and Harbor and Flood Control Act of 1954

Name of project	Installed capacity (kilowatts)
Stockton, Osage River, Mo	7,000
Pomme de Terre, Osage River, Mo	7,000
Lower Cumberland (Alben Barkley), Ky	130,000
Greers Ferry, White River, Ark	96,000
Beaver, White River, Ark	64,000
Belton, Tex	12,000
Cougar, Oreg	25,000
Green Peter and White Bridge, Oreg	96,000
Total for 8 projects	437,000

CRITERIA FOR INCLUSION OF PROJECTS WITH POWER

(*a*) During the 5-year period, fiscal year 1954 through fiscal year 1958, the Corps of Engineers started 11 new multipurpose projects with power, and initiated the installation of additional power units at 2 previously completed projects. (These 13 power installations are listed in response to a previous question.) Funds were also appropriated for one partnership power project (Markham Ferry) in Oklahoma, but work has not been started.

(*b*) Within the general criteria established by the Bureau of the Budget for each of the years (fiscal year 1954 through fiscal year 1958), the Corps of Engineers was in a position to recommend to the Bureau of the Budget only the additional power units at 2 previously completed projects and 1 multiple-purpose partnership project.

(*c*) Generally, the Corps of Engineers recommendations for new starts were based on specific criteria established by Bureau of the Budget for the specific year, depending on overall demands on the annual budget. The criteria in the past for initiating multiple-purpose projects with power were based on urgency of need without large future commitments, or when partnership projects were involved.

Senator WATKINS. I notice you have been discussing the development of the water resources of the United States.

Do you know how many different groups or interests develop those natural resources in the United States other than the Government?

General ITSCHNER. Of course, there are tremendous numbers; as many as there are companies that are engaged in businesses that require the development. I would say there are literally hundreds of

such organizations that are engaged in various degrees of water resource development.

Senator WATKINS. You would say private business has a tremendous stake in the natural resources of the United States?

General ITSCHNER. Yes, sir.

Senator WATKINS. Is some of that primary development?

General ITSCHNER. Yes, sir.

Senator WATKINS. Can you give us an idea how much private industry has been spending for the development of natural resources of water as contrasted with what the Federal Government is spending?

General ITSCHNER. It is a larger amount.

Senator WATKINS. It is a larger amount than the Government spends?

General ITSCHNER. Almost all of the municipal water supplies——

Senator WATKINS. That is not private. First of all, I want to find out how much development is going on by private developers in the country, corporate and partnerships.

General ITSCHNER. I could get that figure for you.

Senator WATKINS. I would appreciate getting that information.

(The following information was subsequently submitted:)

The Bureau of Census of the Department of Commerce cannot furnish the figures requested for private expenditures for water resource development. However, they have stated that in 1955 State and local governments spent $2,577 million for water resource development, and in 1956, $2,375 million for that purpose. Over half of this expenditure was for water supply, with the provision of sewage-disposal facilities second in amount.

Senator WATKINS. Do you know how much is developed by municipalities?

General ITSCHNER. I would imagine that the amount would be even greater for the development of water for domestic purposes.

Senator WATKINS. You know, do you not, that practically all of the water for municipalities is developed by municipalities and no other interests?

General ITSCHNER. That is correct.

Senator WATKINS. It is just recently that they are getting——

General ITSCHNER. It is strictly incidental to other purposes.

Senator WATKINS. And that takes in the overwhelming bulk of the population?

General ITSCHNER. That is correct.

Senator WATKINS. The United States does not enter into that except in an incidental way?

General ITSCHNER. That is correct.

Senator WATKINS. Do you know to what extent States have been making developments in the water resources of the United States?

General ITSCHNER. I think relatively little. Very few States enter into it.

Senator WATKINS. Have you ever investigated that to find out?

General ITSCHNER. No.

Senator WATKINS. Could you tell me for instance, how much is being done in the State of Utah?

General ITSCHNER. No, I could not.

Senator WATKINS. Could you tell me how much is being done by California?

General ITSCHNER. California is a State that has some very large water resource development projects.

Senator WATKINS. Some of the programs being proposed now will even be much larger than those proposed by the United States or developed by the United States in the State of California; is that not true?

General ITSCHNER. Yes, sir; that is true.

Senator WATKINS. Can you give me the figures on that?

General ITSCHNER. No, sir.

Senator WATKINS. Can you supply them for the record?

General ITSCHNER. Yes, sir.

(The following information was subsequently submitted:)

State expenditures for water resource development, 1956

California:	
Soil and water conservation	$8,500,000
Water transportation and terminals	6,600,000
Total	15,100,000
Washington: Soil and water conservation	1,800,000
Oregon: Soil and water conservation	74,000

NOTE.—These are probably incomplete; data from Census Bureau.

A report by the State of California dated May 1957 sets forth a State water plan with a total estimated cost of about $11.8 billion. It includes storage reservoirs, water distribution systems, and powerplants with a total installed capacity of 7,780,000 kilowatts.

Senator WATKINS. What about the States of Washington and Oregon?

General ITSCHNER. I do not know how much they are doing. I do not think they are doing very much up there.

Senator WATKINS. Have you ever studied what they are doing?

General ITSCHNER. No. I have read some articles on it. I have not been particularly concerned with the amount that they are doing because anything they do is very closely coordinated with the Federal program in that area.

Senator WATKINS. They have smaller programs, do they not?

In my State we have what we call the small projects. We do a lot of developing there, and we have been for quite a number of years.

General ITSCHNER. I do not think the State of Washington has any such program at this time.

Senator JACKSON. Flood control on a minor basis.

Senator WATKINS. Do they encourage irrigation?

General ITSCHNER. They encourage it but they do not finance it.

Senator WATKINS. Does the State of Washington or any of the States lend any money for such development?

General ITSCHNER. So far as I know, the activity of the State of Washington with respect to water resource development was limited to the expenditure of $200,000 a year for flood control on minor projects, but I believe that that authority expired several years ago and they have not appropriated any for that purpose since. I feel quite sure that their participation in the water resource development program in a financial way is very little, if any.

Senator WATKINS. Do you know how much has been done by individuals throughout the United States in the development, for instance, of water for irrigation?

General ITSCHNER. Very great.

Senator WATKINS. It is much greater than that done by the United States?

General ITSCHNER. Yes, I am sure it is.

Senator WATKINS. Yet you have not taken into account all of those figures?

General ITSCHNER. That was not the purpose of my discussion.

Senator WATKINS. Just what was the purpose of your discussion?

General ITSCHNER. I was asked to indicate the development that has been going on and is going on in Soviet Russia and in China.

Senator WATKINS. As compared with the Government of that country and the Government in this country?

General ITSCHNER. And I used the comparison with the development in the United States. It was limited to that.

Senator JACKSON. That was a request made of General Itschner. These others came out in connection with questions. He was not requested to go into the other details.

Senator WATKINS. Maybe I can get it out of the witness.

Senator JACKSON. I think in fairness to General Itschner I should state that he was not requested to supply the other information.

Senator WATKINS. I was going to ask him how much he was requested to supply.

Do you happen to have the correspondence with you? I would like to have that go into the record to see just what he was requested to supply.

General ITSCHNER. I have not discussed any other types of development in these other countries.

Senator WATKINS. In Russia there would not be very much development outside of the Government.

General ITSCHNER. I think there are numerous local flood-control projects. There is quite a bit of that type of work.

Senator WATKINS. Do you mean to say they have ownership other than the Government of all of these projects? As I recall, the Senator from Louisiana has just been telling us that there is no such thing as private property in Russia and that it is all owned by the National Government.

Senator JACKSON. They now permit them to own homes up to, I think, a cost of 30,000 rubles. That is about the only exception.

Senator WATKINS. I think he said they had some private automobiles. Maybe he changed it.

Senator JACKSON. I am speaking of land.

Senator WATKINS. Land and anything else, property of all kinds, real and personal.

General ITSCHNER. I have here, sir, the letter signed by the two chairmen.

Senator WATKINS. May I see it?

General ITSCHNER. Yes, sir.

Senator WATKINS. The purpose does not seem to be in this particular letter. It is probably attached to memos.

General ITSCHNER. It has been developed as a result of discussions with the staff of the committee.

Senator WATKINS. The letter itself does not give us very much information.

As a matter of fact, in the United States, practically all of the key development of our natural resource known as water, was undertaken and performed by private enterprise, was it not, up until a very few years ago?

General ITSCHNER. Yes, sir, it was.

Senator WATKINS. It went on to the point where the projects were so large that private enterprise could not finance the development of those projects.

General ITSCHNER. I think that is why the Federal Government entered into the separate fields.

Senator WATKINS. Even as of now, much of the development in this water resources field is being undertaken by private enterprise.

General ITSCHNER. I am sure there is a great deal of it.

Senator WATKINS. In fact, there is more of it being done by private enterprise than there is by the Federal Government.

General ITSCHNER. I am sure that is true of water supply. I am not sure whether it is true of some of the other phases. I know it is not true of navigation.

Senator WATKINS. Of course, you use water as a resource. You travel on it the same as you use land to travel over the highways. You use water for the same purpose of travelling over the rivers, oceans, and lakes, but for more or less the consumptive use of water or the power that may be developed out of it, the overwhelming development in this country has taken place in the past years by private enterprise, isn't that right?

General ITSCHNER. That is right.

Senator WATKINS. There is no dispute on that point at all, is there?

General ITSCHNER. No, sir, not if you take the subject broadly, but you used the word "overwhelmingly" and I am not sure that that is correct with respect to the present status of hydroelectric power development.

The Corps of Engineers has 5,250,000 kilowatts of electric energy installed in its hydro projects and if you add the TVA and the Bureau of Reclamation to that, I think that you will probably find that close to half of the hydro capacity in this country is in plants operated by those three agencies at this moment.

Senator WATKINS. I was talking about in past years prior to the time that the Government got into the development of water resources in a rather large way.

General ITSCHNER. In the early days, it was entirely privately financed.

Senator WATKINS. As a matter of fact, I think it was generally accepted that at least 85 percent of the irrigation projects of the West were developed by private enterprise.

General ITSCHNER. I do not know the ratio of power, but even with respect to power it was probably a very high percentage of the overall picture up until just recently.

Senator JACKSON. There is a man whose 100th anniversary we are celebrating this week—Teddy Roosevelt. I think he started on this multiple-purpose basis.

Senator WATKINS. I think it coincided with his day when private enterprise had done about all it could do under the financing arrangements prevailing at that time.

Senator JACKSON. I believe there were the first multiple-purpose projects where they recognized the use of water for one purpose, Roosevelt Dam being the first one in Arizona.

Senator WATKINS. They used water for one purpose a long time before Teddy Roosevelt arrived on the scene. They made hydropower——

Senator JACKSON. Federal use.

Senator WATKINS. Yes, he was the father of the reclamation program and it was initiated during his administration, but of course, the water for the use of transportation, and a lot of other things have been going on since the world began.

But to get down to comparison of the development in the United States of a natural resource of water, with that in a country that is completely dominated by the Government and where there is practically no private enterprise whatsoever, it is difficult to make a real, honest-to-goodness survey of what the development is between Government and private industry.

General ITSCHNER. I think the comparison I made was not difficult to make.

Senator WATKINS. If it were limited it probably would not be.

General ITSCHNER. To be completely factual, I was not saying one was better than the other. I was trying to give the number of kilowatts and so on from a purely engineering standpoint and that is what I did.

The comparison I made was quite clear—it was the development in Russia on one side, and the development by the Federal Government in the United States on the other.

Senator WATKINS. In other words, you were comparing the activities of the two governments.

General ITSCHNER. That is right.

Senator WATKINS. And the field in which they operate?

General ITSCHNER. That is right. Some of those fields are entirely preempted by the Government in the United States.

Seantor WATKINS. Which ones?

General ITSCHNER. Navigation is. That was one-third of my subject.

Senator WATKINS. Of course, in navigation in the United States we had a great enterprise in times gone by and I still think we should use the rivers. I am in favor of using our rivers and inland waterways of all kinds and the water of the ocean is open to the whole world and we do not have to do much to develop the water resource there.

We just have to use it, but when it comes to the generation of hydroelectric power that is a field in which the Government has been more or less a recent entrant as far as the history of the United States is concerned.

To get a fair comparison of the developments going on in the development of power, you would have to get it from all sources if you wanted to show the relative strength between the United States and Russia in that particular field. It would not be confined to water alone, would it?

General ITSCHNER. What did you say, sir?

Senator WATKINS. If you were going to determine the relative strength of the United States and the Soviet Union in the field of

power, whether they had power to carry on, electric power, to carry on various activities, civil life and their defense industries, you would have to compare the total overall power developed in the United States against the total overall power developed in Russia.

General ITSCHNER. That is exactly correct and that is exactly what I did.

Senator WATKINS. Did you bring into that count all of the private developments in the United States.

General ITSCHNER. Yes, sir; the overall figure that I gave was the entire hydro development of power in the United States and not just Federal.

Senator WATKINS. What about development in the field of thermal power and steamplants?

General ITSCHNER. I was not discussing that.

Senator JACKSON. The resolution did not cover that.

Senator WATKINS. Maybe it did not, but I am trying to find out whether we are getting a fair picture of the United States in the field of power development, whether it comes from water or whether they use water as part of the mechanism for generating steam or coal to generate power or oil or some other natural gas.

I want to get the overall picture. I think it gives an unfair picture to the people of the United States when you start out and say Russia has gone this far ahead of us, and so forth. I do not want the people of Russia to get the opinion that we are so weak that now would be a good time to attack us, and I am afraid so much of that has been said in the past they could easily, if they believed us, attack right now because we are in such a deplorable condition according to the people who have been giving the handouts here recently.

General ITSCHNER. May I quote from a paragraph in my statement? This was in the conclusion:

> We must consider our water-resource development effort in terms of its part in our own overall economic strength and capability. Our economic and industrial system is in a different stage from theirs; it is growing along different lines, and it doubtless has different meanings.

I do not think you can make a direct comparison of one type of development in Russia with the corresponding type of development in this country and get a true overall picture.

Senator WATKINS. I will agree with you 100 percent, and that is why I say the resolution is so narrow that it leaves out these other developments and it does not seem to accomplish what is meant to be accomplished.

In this country, as you know, we do have the private-enterprise system, and it is the private-enterprise system, as a matter of fact, on which we rely to do all of the things that we can do and it is only when we get to the point where the job gets too big for private enterprise that the Government is called in or the Government is justified in doing the development unless, of course, you want a Socialist state.

General ITSCHNER. I thoroughly agree.

Senator WATKINS. You and I are in full agreement on that, then.

If you can furnish me with the figures, since you are in the power business——

General ITSCHNER. I am not; I am in the water-resources end of it.

Senator WATKINS. I think you have to go into the overall aspects of water resources. Is that not part of the job?

General ITSCHNER. Yes, sir.

Senator WATKINS. Can you get me the figures on what the private-power development has been in the United States for the comparable periods that you are talking about?

General ITSCHNER. I will get that information for you.

(The following information was subsequently submitted:)

Installed generator capacity (Federal and non-Federal) and increases in capacity by years kilowatts—United States and U. S. S. R.

	Total United States	Federal United States	Non-Federal United States	U. S. S. R.
Dec. 31, 1954:				
Hydro	24, 238, 318	10, 190, 770	14, 047, 548	----------
Thermal	94, 639, 651	3, 376, 187	91, 263, 464	----------
Total	118, 877, 969	13, 566, 957	105, 311, 012	32, 810, 000
Increase, 1955:				
Hydro	1, 503, 903	1, 109, 200	394, 703	----------
Thermal	10, 513, 792	2, 285, 674	8, 228, 118	----------
Total	12, 017, 695	3, 394, 874	8, 622, 821	4, 421, 000
Dec. 31, 1955:				
Hydro	25, 742, 221	11, 299, 970	14, 442, 251	----------
Thermal	105, 153, 443	5, 661, 861	99, 491, 582	----------
Total	130, 895, 664	16, 961, 831	113, 933, 833	37, 231, 000
Increase, 1956:				
Hydro	643, 659	835, 166	[1] −191, 507	2, 000, 000
Thermal	5, 802, 260	538, 860	5, 263, 400	3, 564, 000
Total	6, 445, 919	1, 374, 026	5, 071, 893	5, 564, 000
Dec. 31, 1956:				
Hydro	26, 385, 880	12, 135, 136	14, 250, 744	8, 370, 000
Thermal	110, 955, 703	6, 200, 721	104, 754, 982	34, 425, 000
Total	137, 341, 583	18, 335, 857	119, 005, 726	42, 795, 000
Increase, 1957:				
Hydro	1, 290, 368	882, 933	407, 435	[2]
Thermal	7, 057, 540	405, 420	6, 652, 120	[2]
Total	8, 347, 908	1, 288, 353	7, 059, 555	[2]
Dec. 31, 1957:				
Hydro	27, 676, 248	13, 018, 069	14, 658, 179	[2]
Thermal	[3] 118, 013, 243	6, 606, 141	[3] 111, 407, 102	[2]
Total	[3] 145, 689, 491	19, 624, 210	[3] 126, 065, 281	[2]

[1] Decrease due to failure of Niagara-Mohawk plant (334,800 kilowatts) in 1956.

[2] Not available.

[3] Includes nuclear plants at Shippingport, Pa. (100,000 kilowatts) and at Vallecitos, Calif. (4,900 kilowatts), which were placed in service in December 1957.

UNITED STATES ENERGY PRODUCTION IN 1957

	[Thousands of kilowatt-hours]
Hydro	133, 241, 441
Thermal	582, 464, 385
Nuclear	----------
Total	715, 705, 826

Source of data: Federal Power Commission.

Senator WATKINS. The illustration that my friend, Senator Kerr, called to your attention, that of the American Telephone & Telegraph Co. spending over a billion dollars, is a development in a field in which the telephone company has substantially 100 percent monopoly.

General ITSCHNER. No, sir; not 100 percent.

Senator WATKINS. Almost. Wherever I go—it may be the Mountain States out where I am—it is all a subsidiary of the American Telephone & Telegraph Co.

General ITSCHNER. That is not correct. There is another telephone company called the General Telephone Co. which is completely independent.

Senator WATKINS. What does it do in proportion to the other one?

General ITSCHNER. It is small.

Senator WATKINS. I know they have some local telephone exchanges around my State, but the big telephone company has not heard of them.

General ITSCHNER. It is not too minor; but it is relatively very small.

Senator WATKINS. That is not quite a fair comparison with the field of natural-resource development, where you have the private enterprise, the municipalities, and all of these other people as well as the Government, and you have an outfit probably with 1 or 2 other companies with it which would have a complete monopoly in the field. That is not quite fair; is it?

General ITSCHNER. I think it is indicative of the feeling that private industry has that they have to expand in order to keep pace with the expansion in the country, and I think it is a fair statement to say that the water resources must be expanded, too.

Senator WATKINS. I am with you 100 percent. I do not think anyone has pushed harder in this Congress than I have for water-resource development, but I am more or less committed to the American principle, I think, announced by Abraham Lincoln that the Government should not do for the people what the people themselves can do in any of these fields.

If the people cannot do it and it is a necessary thing to do it, then the Government is justified in getting into it. That is the American enterprise system. That is the basis of our whole society and that is the difference between what we have here and what they have in Russia.

Do you have any figures on the present rate of hydroelectric power in Russia? How long would it take the Russians to catch up with us if they proceed at their current rate of construction, which you say has greatly increased?

General ITSCHNER. It would be very, very soon.

Senator WATKINS. How soon?

General ITSCHNER. I would say, at the present rate, certainly in less than 3 years.

Senator WATKINS. Even at the present rate?

General ITSCHNER. Even at their present rate and at our present rate which is rather substantial. We are right in a phase now where we are putting on the line quite a bit of power, but I would say within 3 years they can catch up to us.

Senator WATKINS. I think, Mr. Chairman, as far as I am concerned, this is about as far as I can go. Unfortunately, I was tied up this

morning so I could not get here to listen to the general's earlier testimony. There are some questions I do want to ask, particularly with reference to this phase which I have just questioned you about now. He stated earlier today that he would be available for later examination.

I would like, also, Mr. Chairman, to have called representatives from the Department of the Interior and the Federal Power Commission to testify on this very important subject.

Senator JACKSON. I think the Interior representatives are here now.

Senator WATKINS. They have been here as observers, but they have not been invited to appear as witnesses.

Mr. STRAUS. I think the record will show, Senator Watkins, that they were invited to attend and participate in any way they wished.

Senator WATKINS. It would be a little less than the general's undertaking.

Senator JACKSON. I know nothing about the previous details. I came in here fresh today. Any witnesses that the Senator from Utah would like to have who are pertinent to this matter and the Department of the Interior and the Federal Power Commission or pertinent agencies, will be called.

Senator WATKINS. I will suggest some names for tomorrow. I have been out of town for nearly a week and frankly, I am not prepared for this coming up so soon. I thought it was going to be a little later; otherwise, I would have had those names for you.

Senator JACKSON. I just want to make the observation that I think we need both public and private power. I do not think it follows that because you have locally government-owned agencies that you have a socialist state.

If that is true, then we do have the socialist State of Nebraska. Nebraska is the only State in the Union where there is not a single privately owned power company.

Senator WATKINS. I think it is socialistic to that extent. I do not say that it is an improper situation if they want to have it.

Senator JACKSON. Seattle is a socialist city. We have had municipal ownership way back to Teddy Roosevelt's time.

I do not think Tacoma and my city are socialist because they have a municipal plant. Our schools are socialist, our highways are socialistic.

Senator WATKINS. Personally, I think we have adopted some socialism in those fields.

Perhaps it is not the same brand of socialism they have in Russia but it is somewhat socialistic if you want to use the general definition of what socialism means.

Senator JACKSON. I mentioned Nebraska because I do not think it has a record for being the least bit radical. It is the only State in the Union where there is not a single privately owned electric powerplant.

It all happened without the support of a single Federal dam, Corps of Engineers or Bureau of Reclamation project. They did it on their own.

Senator WATKINS. They had it in my State before 1920.

Senator DWORSHAK. I have just a few points to elaborate on.

You have rendered very timely service in presenting this data to this joint committee hearing, and I am wondering whether the sputnik

which seemed to shock the scientific world may not be reflected in your data here which might stimulate interest in water-resource development if your figures are accurate, and I presume that you are relying upon the authenticity of these facts.

That brings me to speculate on this question: We have maintained embassies and consular offices in Soviet Russia and various places. Can you give me any plausible reason why this information has not been made available to the Corps of Engineers, the committees of Congress, and the Interior Department in the past?

Have you thought of this particular aspect of the whole development?

General ITSCHNER. I am sure the information was available.

Senator DWORSHAK. Nobody compiled it?

General ITSCHNER. If we were asked for it——

Senator DWORSHAK. I am not criticizing you; I am just wondering whether, in Moscow and other places, we should have representatives of the Army Map Service and recall our diplomats.

I visited our Embassy in Moscow in the fall of 1955 and I thought that was sort of an advanced post which acted as a sounding board to get this information. I am not talking about CIA. Probably they ought to be brought into the picture. But in view of the fact that you have given us this information, I think the best possible use ought to be made of it, and I am not being critical of the Army Map Service. I am just trying to rationalize why we cannot rely upon our embassies.

Maybe they are too busy attending cocktail parties or cultivating good will in other ways to get this information. I wondered if you would have any plausible explanation for it.

General ITSCHNER. We make use of all of the information that they uncover.

Senator DWORSHAK. Has any of this information come from the Embassy behind the iron curtain?

General ITSCHNER. Yes, I think so. The reason why we have this information is that we must know what the engineering resources of these countries are for our use in planning for an armed conflict which we hope will not occur.

Senator DWORSHAK. Have you compiled this information and data in the past or is this just a recent development?

General ITSCHNER. We do not have it in this particular form, but we have had the information for years and years and, of course, we add to it every year.

Senator JACKSON. In that connection, it would be fair to say that you have a lot of classified information that you cannot go into in an open session?

Senator DWORSHAK. None of this is classified is it?

General ITSCHNER. No, sir.

Senator DWORSHAK. You disturbed me somewhat by your statement that the total known capacity of the Soviet hydroelectric plants is 25,883,188 kilowatts and then you said by comparison the total United States hydro capacity at end of 1957 was 27,676,000 kilowatts.

Then you said this: "Right now Soviet hydroelectric development appears to be roughly equal to ours in amounts." You said that, and I presume you think that is accurate.

General ITSCHNER. Yes, I do think it is accurate.

Senator DWORSHAK. Based on the figures made available to you?

General ITSCHNER. Yes, sir. You might question whether 25,883,000 is roughly equivalent to 27,676,000. The reason is the Russian figures do not include the smaller plants.

Senator DWORSHAK. And there are 44 plants for which the capacities are not made available now to you, so it is easily understood why you think they are equal.

You have not made any comment on the generation of power. This is the installed capacity. I have here a table showing that since 1952 through 1958 we have maintained a ratio of generating billions of kilowatts—as compared with Russia, that our total generation in the United States in Federal and local and private plants, a ratio of about 3½ to 1.

It is a little higher than that, but the amount in the last 3 years was 3.6, 3.5, and 3.5, which means that in 1957 the United States generation amounted to 810 billions of kilowatt-hours as compared with 231 billion kilowatts in Russia, which means that we have generated about 3½ times as much power, which leads me to inquire why, if Russia has about the same installed capacity as we have in the United States, we are currently generating about 3½ times as much power?

I am not an engineer. I mean this sincerely. Can you tell us why that could be correct?

General ITSCHNER. That figure that you gave of 810 billion kilowatt-hours as the amount of generation in the United States—that is hydropower?

Senator DWORSHAK. No, that is everything.

General ITSCHNER. Then that is the answer, because there are several times as many kilowatt-hours generated by——

Senator DWORSHAK. I would say somewhere around about 16 percent. No, it is a little bit more than that.

Mr. FRANK L. ADAMS (Federal Power Commission). Twenty percent is hydro and eighty percent is steam.

Senator DWORSHAK. We are ahead in power when you consider all kinds of generation; whereas the comparison you made in your statement was based upon hydroelectric generation?

General ITSCHNER. That is right.

Senator DWORSHAK. You also said that 70 percent of the power generated in these hydroplants in Soviet Russia is used by industry? Did you say that, for industrial use?

General ITSCHNER. I did not say exactly that, but I do not doubt that it is true. I would be surprised if it were not more than that. What I said was that about 70 percent of all Soviet power is used for industry.

Senator DWORSHAK. If that is true, that goes back to the comparison of hydro and total generation. If that is true, it would indicate a great acceleration of industrial development in the Soviet Union if they are requiring this tremendous output of power for their industrial development.

General ITSCHNER. That is correct. Very definitely most of their power is going into their industrial plants. Very little is going for domestic use.

Senator DWORSHAK. I think the Senator from Washington mentioned that probably they are diverting quite a lot of their power for nuclear development. Did you not make that comment?

Senator JACKSON. I am sure, knowing what our requirements are, that I said earlier this morning that I believe the exact percentage figure which you could obtain—I am not sure whether it is classified—can safely be said to be in excess of 5 percent of the total power requirement of the country, which today goes for the support of our nuclear powerplants.

Senator DWORSHAK. Regardless of whether this is hydro power—and I presume there is considerable thermal power, though you said that it is difficult to find adequate deposits of coal for transportation, which leads to the conclusion that probably a larger percentage of the generation in power in the Soviet Union comes from hydro sources than in this country—but would you say that is correct?

General ITSCHNER. That is definitely true. One reason for that is the lack of fossil fuels, but one even greater reason is that they have excellent hydro sites available. We do not have many attractive sites left, so we do not have too large a potential.

Senator DWORSHAK. So the generation of hydroelectric power is more attractive there than in this country as compared with other countries.

General ITSCHNER. Definitely, at this stage of development.

Senator DWORSHAK. I want to commend General Itschner for making available these data. I feel that during the remainder of this session our congressional committees will be able to utilize this information and put it to good use.

I asked these questions because it shocked me to think that there is a possibility that while we have considered the Russian people a backward people to a large extent until the sputnik episode—and probably we have been deceived by propaganda within our own country that actually they are making great progress—that reminds me of an experience I had.

I would not go into detail, but in September of 1955 when Senator Young and I went behind the Iron Curtain, we spent only a week in Russia and I certainly cannot qualify as being an expert, but out of my own curiosity I wanted to ascertain whether it was true under the communistic form of government over there that in every element of their economy they were lagging far behind us and when I came home and reported on what I had seen during my short visit, invariably people would look at me and say, "Well, they brainwashed you over there," and I think an outstanding service has been rendered by Senator Jackson, Senator Ellender, and other Members of Congress who have made trips behind the Iron Curtain to make firsthand surveys and to acquire accurate information so that we can be guided by factual data rather than to be misled by propaganda which has apparently been the case in the past in this country.

Senator O'MAHONEY. Senator Neuberger, I understand that you have not had your session of interrogation.

Senator NEUBERGER. Thank you very much, Mr. Chairman. You are always kind.

First I want to say, it is always a privilege to ask questions of General Itschner. We in the Northwest have many reasons for being

appreciative of the general's skill and his dedication to the sound resource development.

I would like to ask you a few questions which are germane to the part of the country where Senator Jackson and I come from and where you have had so much distinguished service.

What percentage of our hydroelectric power is in the Columbia River Basin?

General ITSCHNER. I believe something like 40 percent of our hydro potential is in the Columbia Basin.

Senator NEUBERGER. That would make it our greatest asset from the standpoint of potential hydroelectricity?

General ITSCHNER. Yes.

Senator NEUBERGER. Do you know of any sites on the great rivers of Russia where, to your knowledge, projects are under construction which would develop less than the full waterpower potential of that particular water site?

General ITSCHNER. I know of none that develops less than the full power potential, but there may be some. I cannot answer that question. I do not know.

Senator NEUBERGER. To your knowledge, you are not particularly aware of any that would fall into that category?

General ITSCHNER. No, sir; and judging from the size of some of these projects, and the flow of the rivers at those points, I feel that they must be using at least a large part of the potential of these sites. When you get 6 million kilowatts installed capacity on a river as far up as the Yenisey plant is, it must be using a good deal of the flow of that river and it must have sufficient storage capacity to permit it to store at least an annual supply of water.

Senator NEUBERGER. Are these projects on the great rivers of Russia solid concrete dams or are they rock-filled dams, to your knowledge?

General ITSCHNER. We do have a good deal of information on that subject. The Russians are tending to build more and more rock- or earth-fill dams with just the powerhouse and spillway of concrete.

I am sure that their technology is advanced to the stage, where, if they had a narrow gorge site, a site where the abutments were on sound rock, they would undoubtedly build concrete arch dams, but most of their rivers are not of that type. Most of them have a bluff on one side and a low flood plain on the other, and in those circumstances they usually build an earth-fill or rock-fill dam.

Senator JACKSON. Would you yield for a question at that point?

Senator NEUBERGER. Certainly.

Senator JACKSON. General, did you cover the problems that were inherent in dealing with the development for important purposes on a river like the Angara, which is frozen over during a substantial period of time? I believe the same is true on the Yenisey.

General ITSCHNER. No, sir; I did not cover that problem.

Senator JACKSON. Many have said it is almost an impossible task, they would not be able to develop that area, and yet, on the Yenisey they are going to have one project that will be a little over three times the size of Grand Coulee Dam.

I think this would be a very interesting point.

General ITSCHNER. There are three major rivers in Siberia that flow into the Arctic Ocean which might be developed for power. In fact, there is at least one dam contemplated on each one of them.

Then there is a fourth river over on the eastern edge of Siberia which flows into the Pacific Ocean. That, too, is subject to freezing in winter.

I do not think that the problem is too difficult even though the temperatures go down to 65° and 70° below zero at times, because the dams are built high enough so that they create in back of them a deep reservoir. The reservoir is such that the surface is frozen over and the velocities are such that the ice does not break up until the spring thaw, then most of it melts or becomes soft in places.

The intakes for the water supply for the turbines are far below the surface of that ice. I did have some report where one project which they built had some trouble due to the crushing effect of the flowing ice. It is a problem.

Senator JACKSON. From an engineering standpoint, you can make those allowances that may cost extra?

General ITSCHNER. We can design them to take care of any ice problems that they might have so long as we have an adequate reservoir back of them.

Senator NEUBERGER. I appreciate Senator Jackson making this interjection because he has visited Russia and has a far more profound, intimate knowledge of this.

Senator JACKSON. I do not profess to be an expert on Russia by any stretch of the imagination.

Senator NEUBERGER. I quoted you in Harper's magazine as an expert on Russia.

General, you mentioned that the Columbia Basin had approximately 40 percent of our own potential hydroelectric capacity.

I have a list here of the multipurpose Federal dams which were authorized for construction by the Government in the Columbia Basin between 1933 and 1953. This is the list: Dorena, Lower Monumental, Lower Granite, Little Goose, Green Peter, Hills Creek, Cougar, John Day, Holley, Fern Ridge, Cottage Grove, Detroit, Ice Harbor, Lookout Point, Chief Joseph, The Dalles, McNary, Grand Coulee, and Bonneville.

Does that list seem substantially accurate to you?

General ITSCHNER. Yes, sir; I think that it is accurate.

Senator NEUBERGER. To your knowledge, how many multi-purpose dams have been authorized for construction by the Federal Government in the Columbia Basin since 1953?

General ITSCHNER. Eight multiple-purpose projects have been authorized for construction by the Federal Government since 1953, sir. They are Stockton and Pomme de Terre, in Missouri; Lower Cumberland, Ky.; Greers Ferry and Beaver, in Arkansas; Belton, Tex.; and Cougar and Green Peter-White Bridge in Oregon.

Senator NEUBERGER. I would like to ask you if these figures seem accurate. I note that in the budget recommendation for Corps of Engineers projects in the Pacific Northwest, in fiscal 1953, the recommended sum was approximately $167 million. The recommended sum for fiscal 1959 was approximately $63 million.

Do those figures seem approximately correct?

General ITSCHNER. The figure for 1959, sir, I believe is correct. I am not able to say what the amount was in 1953, although I actually was there at the time. It is hard for me to remember, but it was in that range.

Senator NEUBERGER. Would it be fair to say that in recent years there has been neglect so far as Federal development is concerned of the potential hydroelectric power resources of the Columbia Basin? I will not ask you to comment on the word "neglect." That is what I would say is an opinionated word. Let me revise the question and say, would it be fair to state that since 1953 there had not been comprehensive development by the Federal Government of the remaining potential hydroelectric resources of the Pacific Northwest?

General ITSCHNER. I believe I can answer you, sir, by saying that I think that the amount that has been expended by the Federal Government on projects in the Pacific Northwest has declined progressively through those years. On the other hand, the accomplishments have been rather great.

We have virtually finished Chief Joseph Dam and have finished McNary Dam in that time, and the Dalles Dam is well underway now and is putting power units on the line.

I think the overall level of activity in that area has decreased.

Senator NEUBERGER. General, you mentioned the fact that you were nearing completion on Chief Joseph, that you had completed McNary, and that you were nearing completion on The Dalles.

General ITSCHNER. That is correct, sir, except that on The Dalles we are just beginning to get the power units on the line, as you know.

Senator NEUBERGER. Those three structures, Chief Joseph, McNary, and The Dalles, were they not all authorized and all actually started prior to 1953?

General ITSCHNER. Yes, sir; that is correct.

Senator NEUBERGER. Have you started construction of any multipurpose project in Oregon and Washington except John Day, and that only $1 million of construction, since 1953?

Senator JACKSON. And Ice Harbor.

Senator NEUBERGER. Ice Harbor, Cougar, and Hills Creek. Are there any others? There is John Day, Ice Harbor, Cougar, and Hills Creek. Were all of those authorized prior to 1953?

General ITSCHNER. All of them were authorized prior to 1953 except Cougar, which was authorized in 1954.

Senator NEUBERGER. Comment was made earlier here that perhaps this material had not been brought to the attention of the Congress. My memory may be faulty going back nearly 25 years, and the Senator from Washington can check me on this, but if I am not mistaken when an effort was made by his distinguished predecessors, Senators Dill and Bone, and by my distinguished predecessor, Senator McNary, to bring about authorization of projects like Grand Coulee and Bonneville, if I am not mistaken these men cited repeatedly the material given them by Col. Hugh Cooper about the Dneprodzerzhinsk then already existing in the Soviet Union. Was not the Dneprodzerzhinsk, which is a very large project by standards of 1933, in existence then in the Soviet Union and well known to the people in the United States?

General ITSCHNER. That is correct. It was built and designed by Hugh Cooper, the man that you spoke of.

Senator NEUBERGER. And he was an American engineer, was he not?

General ITSCHNER. Yes, sir.

Senator JACKSON. And it was destroyed in large part during the war; that is, the generating facilities, and so on.

Senator NEUBERGER. Is it your opinion that only the Columbia River among our great rivers compares in hydroelectric capacity to some of the greater waterways of Russia? Do we have any other river other than the Columbia that compares in capacity to some of those?

General ITSCHNER. No, sir. I would say that we do not have any other river that begins to compare with a river such as the four major rivers in Siberia. The St. Lawrence has quite a large hydro capacity, of which a part is in the United States, and, of course, Niagara Falls has a large hydro capacity, but aside from that the other rivers do not have a very large amount. The Missouri is not particularly large.

Senator NEUBERGER. From the standpoint of power potential?

General ITSCHNER. Yes, sir.

Senator NEUBERGER. Mr. Chairman, thank you very much for your forbearance, and I want to thank General Itschner for the knowledge and wisdom he always contributes to these matters.

Senator O'MAHONEY. How is the Colorado?

General ITSCHNER. That does not have the flow, sir, that the Columbia has. The Columbia has 180 million acre-feet, which is very, very large.

Senator O'MAHONEY. Are you familiar with the Hoover Dam?

General ITSCHNER. Yes, sir. That is a very large project on the Colorado River.

Senator O'MAHONEY. Yes.

Can you express an opinion about the effect of that project on the economy of southern California?

General ITSCHNER. I am sure that that project has been extremely beneficial to the economy of southern California, both the power that is generated and the stabilization of flows in the river so that the intakes for the water-supply system for Los Angeles and southern California could be made more effective.

Senator O'MAHONEY. I might say that I am disappointed to have you testify that the Russian rivers are so much larger than American rivers. I might really call the State from which I come the roof of the continent, because within the boundaries of that State there are sources of the Columbia River, the Colorado River, and the Missouri and Mississippi Rivers. As a matter of fact, up near Yellowstone Park, I think we can find 2 or 3 of these streams starting within an area of—what would you say, Mr. Nelson—50 square miles.

Mr. NELSON. Yes, sir.

Senator DWORSHAK. Mr. Chairman, you made reference to the runoff of the Colorado River. I do not know whether General Itschner can verify this, but records maintained by the Bureau of Reclamation over more than a quarter of a century show that the average annual runoff or discharge of the Colorado down near Flagstaff, Ariz., is only about 12 million acre-feet, while the Clearwater, the single tributary of the Snake and of the Columbia has an average runoff of about 10½ million acre-feet. Is that approximately correct?

General ITSCHNER. I think that is right, yes, sir.

Senator O'MAHONEY. Of course, the Snake starts in Wyoming and goes into Idaho.

Senator DWORSHAK. This is not the Snake. This is the Clearwater. It rises entirely in Idaho.

Senator O'MAHONEY. Are there any other questions?

General, we are very much indebted to you. It has been a very interesting hearing. I am sorry I had to absent myself for a little over an hour this afternoon.

I was listening to the Attorney General testify on the constitutional amendment.

Is Mr. Merrill in the room?

Mr. Bennett, were you in the room while Senator Kerr was asking questions of General Itschner?

Mr. JOHN B. BENNETT (Director, Technical Review Staff, Department of the Interior). Yes, some of them.

Senator O'MAHONEY. You probably heard him ask the general to submit details of the Corps of Engineers original budget requests and the comparisons with the allowances finally sent to Congress under the criteria. Will you review the transcript and convey the same request to the Secretary regarding the Bureau of Reclamation budget request and allowances as was made by Senator Kerr to General Itschner?

Mr. BENNETT. Yes. I will be glad to do that.

Senator O'MAHONEY. Thank you very much.

(The data requested from the Department of the Interior and the Corps of Engineers were subsequently submitted and appear on pp. 253–257 of the appendix.)

Senator O'MAHONEY. Mr. Merrill, we will be very glad to have your testimony now, sir.

STATEMENT OF FREDERICK T. MERRILL, DIRECTOR, EAST-WEST CONTACTS STAFF, DEPARTMENT OF STATE

Mr. MERRILL. Shall I identify myself?

Senator O'MAHONEY. Please.

Mr. MERRILL. I am Frederick T. Merrill, the director of the East-West contacts staff of the Department of State.

I believe I am asked to tell the committee, Mr. Chairman, something about our recent agreement with the Soviet Union in regards to exchanges.

Senator O'MAHONEY. With respect to this matter of the development of hydroelectric waterpower and similar developments that may be going on.

Mr. MERRILL. We have had under informal discussion with the Soviet Government for 2 or 3 years an exchange of delegations of experts in hydroelectric power.

In 1956 the project of suggesting such an exchange was held up because of the possibility that Malenkov would join such delegation coming to this country. It was thought not feasible at that time to carry out that exchange for that reason.

In the fall of 1956 the Hungarian revolution occurred and the exchange was shelved.

Recently we have revived the idea of having an exchange of expert delegations with the Soviet Union.

In connection with our negotiations in the last 2 or 3 months with the Soviets on industrial exchanges this matter was discussed.

The Soviet Union wished to have an exchange of delegations which would spend 2 or 3 months in each other's country.

The Department of State was interested in other exchanges, also, and in the negotiations that followed it was found impossible to negotiate

an exchange in hydroelectric power and still get the exchanges that we wanted, so that we decided to go no further with this particular exchange in the negotiations and in the agreement.

Therefore, in the agreement recently signed, the only industrial exchanges mentioned are in iron and steel and in the plastics industry.

However, we and the Russians agreed that this agreement was not exclusive and that we could propose in the next year or two any other exchanges that we felt desirable on either side.

We do also intend to negotiate with the Soviet Union an exchange in the field of reclamation, particularly in respect to the International Commission on High Dams which meets in New York in September of this year. The Soviets are participants in this meeting. They desire to make postconference tours of all our high dam installations.

Senator O'MAHONEY. This conference in New York was arranged when and by whom?

Mr. MERRILL. This conference is an international meeting that has been arranged by the Bureau of Reclamation and is something that occurs periodically. The Soviet delegation has shown an interest in taking a tour in three areas of this country to observe our high dams, our reclamation projects.

Senator O'MAHONEY. During how many years has this conference been held?

Mr. MERRILL. I believe, subject to a correction, that it has been held for, I think, probably 5 or 10 years.

I am not an expert in this field so I just do not know.

Mr. STRAUS. I happen to be a member of the International Commission on large dams.

It was held for 25 years or more. The last one in Washington was held in 1934, I believe.

Senator O'MAHONEY. In what manner was the Commission set up? Was it set up by an act of Congress?

Mr. STRAUS. No, but the participation in the last meeting in Washington was by act of Congress.

Senator O'MAHONEY. When was that?

Mr. STRAUS. That was in 1934 or 1935, if I remember correctly.

Senator O'MAHONEY. How are the delegates to the conference selected?

Mr. STRAUS. They are selected by the International Committee on High Dams, of which I believe a Frenchman is at present the head. The American who was a recent head of the International Commission was Mr. Hathaway of the Army engineers.

Senator O'MAHONEY. By whom was the International Commission set up?

Mr. STRAUS. I think originally, prior to the last war, it was set up by request of the World Power Conference to the United States Government.

Senator O'MAHONEY. The only act of Congress which you recall is the one to which you just referred?

Mr. STRAUS. That is the only act of Congress I recall.

The State Department at various times has been consulted and arranged for American delegates to go to meetings that were held in Stockholm, Paris, and New Delhi, and other places.

Senator O'MAHONEY. Has the State Department given its blessing to these conferences?

Mr. MERRILL. Yes, on these international conferences, particularly this one that is being held in New York, the State Department has agreed that there should be participation by all membership of the Commission, which includes the Soviets.

The problem arises, Mr. Chairman, when the Soviets wish to tour the country subsequent to the holding of the Conference. We feel that we should get reciprocity for any such tour in which the Soviet delegation tours and inspects our installations and we propose to negotiate a reciprocal tour of the high dams and installations in the Soviet Union.

Senator O'MAHONEY. By whom will this tour be carried out if it is authorized?

Mr. MERRILL. I have a letter here that has just been received from the Department of the Interior, Bureau of Reclamation, signed by the Commissioner, and they have suggested and offered to put forward several engineers from the Bureau for participation in this particular exchange.

We would hope that, if such an exchange was negotiated and agreed to, both engineers of the Army engineers or the Bureau of Reclamation or other private engineers who are interested would engage in this exchange.

As I say, this letter has suggested an itinerary which is very extensive and I should think would be of great interest to this committee.

Senator O'MAHONEY. I am sure it would.

Mr. MERRILL. We welcome membership on this delegation by this committee.

Senator O'MAHONEY. Would you care to put this letter in the record?

Mr. MERRILL. I will be glad to put this letter in the record when it is convenient for you to do so.

(The letter referred to follows:)

DEPARTMENT OF THE INTERIOR,
BUREAU OF RECLAMATION,
Washington, D. C., February 7, 1958.

MR. FREDERICK T. MERRILL,
Director, East-West Contacts Staff,
Department of State, Washington, D. C.

DEAR MR. MERRILL: Your letter of January 10, 1958, suggested that the Bureau of Reclamation prepare an itinerary of a tour in the Soviet Union that would be of interest to an American delegation and which would be comparable to the proposed tours of United States dams for which the U. S. S. R. delegation may apply following its attendance at the International Congress on Large Dams which will be held in New York on September 15–20, 1958.

We are pleased to be of assistance in outlining an itinerary which in our opinion would be of interest to engineers concerned with the construction of dams, hydroelectric plants, and irrigation projects.

Based on information appearing in newspapers and technical articles, we have compiled itineraries covering 2 tours which would represent a minimum number of dams to be visited in order to be comparable to the 3 tours proposed in connection with the International Congress on Large Dams. As an illustration, the 2 itineraries proposed of a tour to U. S. S. R. contain visits to less than 25 dams whereas the 3 tours of the International Congress on arge Dams contain visits to more than 40 dams. While 3 separate tours are available in connection with the Congress on Large Dams, we propose only 2 tours of dams in the U. S. S. R. at this time.

In view of the long distances involved in the U. S. S. R. travels, and not being familiar with the modes of transportation and lodging available, we estimate that the proposed itineraries would each require at least 3 weeks within the U. S. S. R.

The matter of climatic conditions and timing with regard to construction operations are important. It would appear that midsummer travel would be most desirable primarily because it would coincide with the active construction season. In order to have representation of the various engineering specialties involved in dam construction, we suggest that consideration be given to having an adequate number of delegates on each tour.

We hope that you will be able to arrange for these tours and that we will be given an opportunity to nominate several engineers from the Bureau of Reclamation for the delegation. Do not hesitate to call on me if I can be of further assistance.

Sincerely yours,

W. A. DEXHEIMER, *Commissioner.*

Senator O'MAHONEY. Is any appropriation made for the expenses of this group?

Mr. MERRILL. From my experience the Bureau of Reclamation has not had funds to participate in these trips or these exchanges. I cannot speak for the Bureau, but, as far as I know, no specific budget request has been made for this purpose.

Senator O'MAHONEY. Who would go? Has there been any meeting or understanding as to who would go?

Mr. MERRILL. Not yet, Mr. Chairman. This letter is only 1 week old. The Conference on High Dams is in September and we would expect to have further conversations with the Bureau.

Senator O'MAHONEY. Is this different from your exchange program of which you have spoken?

Mr. MERRILL. This is a part of the exchange program. It develops from Soviet attendance at a conference and a desire on their part to make a tour of the United States.

Senator O'MAHONEY. Has the State Department held any conference as yet with respect to the selection of individuals to participate?

Mr. MERRILL. In the question of the hydroelectric power exchange, as distinguished from this particular exchange, we have had certain conversations with the Detroit-Edison Co., in conjunction with representation from the Federal Power Commission and the Bureau of Reclamation in order to work up a delegation to engage in that particular exchange.

Sentor O'MAHONEY. Are there any other public utility companies interested in this?

Mr. MERRILL. I think primarily Detroit-Edison, sir.

Senator O'MAHONEY. Is Detroit-Edison selecting personnel for this?

Mr. MERRILL. They are assisting in the choice of personnel and they are underwriting the expense of the exchange.

Senator O'MAHONEY. What is the estimated amount of the expense?

Mr. MERRILL. I do not think it is very high. I think trips to and from the Soviet Union today, including 3 weeks in the Soviet Union, run between $2,000 and $3,000 per person.

Senator O'MAHONEY. It is rather unusual for a private corporation to underwrite the expense of a Government tour, is it not?

Mr. MERRILL. Let me explain this, Mr. Chairman: These arrangements we have made with the Soviet Union for industrial exchanges and other exchanges depend entirely on private initiative, private moneys, private institutions, and so forth.

We were asked by Congressman Rooney, when appropriation time came up last week, if we were committing the Congress to an expenditure of funds by signing this agreement, and we have not. We are dependent entirely on private initiative to carry out these exchanges and, therefore, when we wish to work up an exchange in any industry, we go to that industry and we ask them would they be interested in going and would they underwrite the expenses; and they have been very cooperative and that is the reason why we must seek private industry assistance.

I think perhaps it is a good way to do it, but that does not mean that people who are experts in the Government may not join these delegations.

Senator O'MAHONEY. Do the members of the delegation have any responsibilities, any powers, or any duties?

Mr. MERRILL. Their responsibilities are, naturally, to participate in the writing of a report, and that report I would assume, and it has been the case in other exchanges of delegations, is of very great assistance in accumulating knowledge about the Soviet Union in this country.

Senator O'MAHONEY. Have such reports been made in the past?

Mr. MERRILL. There have been reports.

Senator O'MAHONEY. And publicized?

Mr. MERRILL. Not publicized, because many of them are classified in nature.

Senator O'MAHONEY. They are filed with the State Department?

Mr. MERRILL. They are filed in the State Department and in the other agencies of the Government concerned.

Senator O'MAHONEY. Have any been published at all, or are they all regarded as classified?

Mr. MERRILL. No, they are not all regarded as classified. Some, I believe, have been published in mimeographed form.

Senator O'MAHONEY. If a tour of an exchange affecting hydroelectric installations in Soviet Russia, such as we are talking about, were made, would that be classified information, or would it be public information?

Mr. MERRILL. I should imagine the great majority of it would be public information. Perhaps some of it would be classified. In any case, I should think it would be made available to all those who have a right to be interested.

Senator O'MAHONEY. It would be made available, of course, to the committees of Congress?

Mr. MERRILL. Oh, yes.

Senator O'MAHONEY. I have interrupted you. I hope you can pick up where you left off.

Mr. MERRILL. I think that really covers the part of our exchange agreement that concerns this committee.

I would be very glad to make any comments on the agreement that you desire and if you have more questions I would be glad to answer them.

Senator O'MAHONEY. The agreement of which you speak is the agreement in which our country has participated to engage in exchanges?

Mr. MERRILL. To engage in exchanges of a specified nature.

Senator O'MAHONEY. That is an executive agreement?

Mr. MERRILL. Yes.

Senator O'MAHONEY. It never has been submitted to the Senate?

Mr. MERRILL. No, it does not have to be.

Senator O'MAHONEY. Some of us sometimes think that executive agreements might well be submitted to the Senate for its consideration.

Mr. MERRILL. May I describe this?

Senator O'MAHONEY. Please do.

Mr. MERRILL. It is not really an executive agreement in the ordinary sense. It is an agreed plan with the Soviet Government to execute certain exchanges during the next 2 years. In other words, it is a plan of exchanges, of track teams, of singers, of students, of various delegations of one kind or another.

The Soviets have made such an agreement also with the French. It is merely so that we know that in September, on such-and-such a date, such-and-such a delegation will go and another will come. There is a great deal of planning connected with these various visits.

Senator O'MAHONEY. Would it be wrong to say that this exchange program is designed to promote an exchange of information, and it has no political objective at all?

Mr. MERRILL. I would say it has many objectives, Mr. Chairman. One of the obvious objectives is to promote a better understanding between the people of the two countries, to contribute in some small degree to relaxation of tensions.

Senator O'MAHONEY. It is not unlike the Intercontinental Geophysical Year.

Mr. MERRILL. In some respects the IGY activities dovetail into these exchanges, because many of the exchanges between scientists and attendance at conferences in this country by scientists are in connection with the IGY.

Senator O'MAHONEY. Does this controversy of which we hear a great deal every once in a while in this country between private and public power have any relationship to the program?

Mr. MERRILL. I would not see any relationship, sir.

Senator O'MAHONEY. You would not see any. Is there anything else you desire to put in the record?

Mr. MERRILL. If you would like, I will put in the record the agreement that we made.

Senator O'MAHONEY. Yes; I think that would be well to have that in the record.

(The agreement appears on p. 233 of the appendix.)

Senator O'MAHONEY. There would be no objection to printing the speech Mr. Lacy made before the National Press Club a few weeks ago and to which you have made reference?

Mr. MERRILL. No; there would be no objection.

Senator O'MAHONEY. It deals with the same subject.

Mr. MERRILL. Yes.

(The speech of Ambassador Lacy appears on p. 263 of the appendix.)

Senator DWORSHAK. Mr. Chairman, may I ask one question?

Senator O'MAHONEY. Senator Dworshak would like to ask a question.

Senator DWORSHAK. Mr. Merrill, in your official capacity, have you detected, say, within the past 5 years, any material change in the inclination on the part of the Soviet leaders to make available some of

this information and data related to their economic development as compared with 10 years ago?

Mr. MERRILL. You mean the Soviets?

Senator DWORSHAK. Yes.

Mr. MERRILL. The Soviets, as a Government, are very hesitant to release data. If you ask for documentation officially, they are very slow to give it to you. They often will do it on an exchange basis. However, in the informal give and take between delegations and where people are talking their own language, so to speak, there has been considerable interchange of information orally and in some degree an exchange of written material, but this all takes place below the level of official Government exchange.

Senator DWORSHAK. The Russian have been inviting Members of Congress and other Americans to visit the Soviet Union, to make their own personal inspection and observations. That has been a development within the past 2 or 3 years?

Mr. MERRILL. Yes, sir, and they are very anxious to have delegations of Congressmen visit the Soviet Union.

Senator DWORSHAK. Would that indicate a confidence on their part that they have been making vast progress and that want the Americans and the free nations of the world to be aware of that development?

Mr. MERRILL. Frankly, I think first it is a prestige matter for them to be able to show the distinguished Members of the United States Senate visiting their country. I think also they are more confident in recent years and they do not mind showing people around their country, that there has been considerable improvement and they are proud of it, so that I think there is a combination there.

Senator DWORSHAK. You have discerned that change, then, in procedure?

Mr. MERRILL. Yes.

Senator DWORSHAK. It was true that at the Geneva Conference in August of 1955, there was a free exchange between the representatives of the Soviet Union and the representatives of the free world concerning nuclear power development, was there not?

Mr. MERRILL. Yes, sir.

Senator DWORSHAK. That was quite a radical departure at that time; was it not?

Mr. MERRILL. Yes, sir. They felt very confident, I think, that they were almost up to us in that respect and they were perfectly willing to exchange.

In fields where they think they have parity with us I think they are perfectly willing to exchange information.

Senator DWORSHAK. It probably has not come within your jurisdiction, but were you surprised in any way by the comments and the statement made by General Itschner concerning hydroelectric development in the Soviet Union?

Mr. MERRILL. Sir, I am not an engineer and I am not an expert in the field. I must say I was very interested and considerably surprised that we had developed such thorough information although I have known through my conversations with several who are in private industry that they have considerable information on developments in the Soviet Union, which go back, of course, to the time General Electric built their turbines back in 1953 or 1954.

However, I really have not been following it.

Senator DWORSHAK. That is not part of your official duties?

Mr. MERRILL. No, sir.

Senator DWORSHAK. Thank you.

Senator O'MAHONEY. Mr. Merrill, may I request you formally to notify the committee when the selections are made for this exchange program? I mean the individual selections.

Mr. MERRILL. Yes, Mr. Chairman.

Senator O'MAHONEY. Did I understand you to say that perhaps Members of Congress who desire to go, like Senator Ellender, might be accepted as members of the delegation?

Mr. MERRILL. Members of Congress are welcome on any and all exchange arrangements we can make with the Soviet Union, but when the Soviets asked us in the Department if it would be all right for them to exchange members of the Supreme Soviet and members of the United States Senate, United States Congress, we replied that it was entirely a matter for their decision; the executive was not going to make any decision for the legislative, so it is entirely up to you gentlemen; and I believe when Zaroubin left he told the Vice President that he hoped that there would be more exchanges of Congressmen and Senators with their members of the Supreme Soviet, albeit how they are elected. I do not believe they are elected freely.

Senator O'MAHONEY. Recently you advised me, because of the query that I had from a citizen, that three observers were selected by the State Department to watch the next Grand or Supreme Soviet election in Russia. I was told that the names were selected by the State Department and then were submitted to the Soviet for their approval or disapproval, and no announcement was made until you received formal acknowledgement from the Soviet Government that these delegates whom the State Department had selected were acceptable to the Soviet Government. Is that the same system that will be used?

Mr. MERRILL. That is substantially correct.

May I say this, though; that the three members of this election observer team were not selected by the State Department without the consultation of the Governmental Affairs Institute, which is a private institute which makes the business of studying elections and who handled the visit of the Soviet election team in 1956. They recommended the three members that are now going to go over there next week, March 1. Then we submitted those names to the Soviets, but we did not say that they would have to pass on them. We are giving them a delegation and they are, naturally, going to accept it. They are not in any position to refuse.

Senator O'MAHONEY. I meant only in a diplomatic way. You proposed them so they would have an opportunity to object if they cared to do so, though you did not invite them to object.

Mr. MERRILL. That is right.

I have a copy of the statement of William S. B. Lacy, Special Assistant to the Secretary of State for East-West Exchange.

Senator O'MAHONEY. Thank you very much.

(The statement referred to has been filed with the committee.)

Senator O'MAHONEY. Do you want that back?

Mr. MERRILL. No.

Senator O'MAHONEY. Are there any other questions, Senator?

Senator DWORSHAK. No.

Senator O'MAHONEY. Mr. Merrill, we are very much obliged to you. We are sorry that Mr. Lacy is snowbound, but he is probably enjoying himself, and we have enjoyed your presence here.

Has the paper of Mr. Davis been received?

Mr. STRAUS. That has not been received. It was due yesterday and the request will be that it be included in the record. It is an appraisal and analysis of Russian irrigation development.

Senator O'MAHONEY. What is his full name?

Mr. STRAUS. Horace Davis.

Senator O'MAHONEY. What is his position?

Mr. STRAUS. He is in the Foreign Agricultural Service of the Department of Agriculture, but this paper is provided to the committee in his recent position for a number of years as agricultural attaché to the United States Embassy in Russia.

Senator O'MAHONEY. His statement will be included in the record.

(Mr. Davis' statement appears on p. 238 of the appendix.)

Senator O'MAHONEY. Senator Watkins indicated to the chairman that he would like to make a statement before this committee. A convenient time has not been set as yet. As a matter of fact, he has not had time to prepare the statement he wants to put in, so the committee will stand in recess at the call of the Chair and that call will be made, I hope, some time during the coming week.

Mr. STRAUS. Mr. Chairman, the representative of the Farmers Union, Mr. Angus McDonald, who had requested to testify, would like his statement printed in the record. He has been calling up intermittently during the day to say that he is at the bottom of a snowdrift out beyond Oxon Hill and running out of gasoline.

Senator O'MAHONEY. He started running out of gasoline this morning when you first told me the story. It must be all gone by this time.

Mr. STRAUS. I believe it is, sir.

Senator O'MAHONEY. His statement may be presented and it will be made a part of the record.

(Mr. McDonald's statement appears on p. 241 of the appendix.)

Mr. STRAUS. And the statement of Mr. Alex Radin, general manager of the American Public Power Association, when received, will be similarly handled?

Senator O'MAHONEY. Yes, Mr. Radin's statement may also be included.

(Mr. Radin's statement appears on p. 249 of the appendix.)

Senator O'MAHONEY. The committee is now in recess.

(Whereupon, at 4 p. m., the hearing was recessed, subject to the call of the Chair.)

WATER RESOURCE DEVELOPMENT

FRIDAY, MAY 16, 1958

UNITED STATES SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
AND COMMITTEE ON PUBLIC WORKS,
Washington, D. C.

The committee met at 10 a. m., pursuant to notice, in room 224, Senate Office Building, Senator Frank Church presiding.

Present: Senators Church, Neuberger, and Watkins.

Senator CHURCH. The hearing will come to order.

I will read for the record a letter I have from our colleague, Senator O'Mahoney, asking me to preside at the recessed hearing on Senate Joint Resolution 248.

MAY 14, 1958.

Hon. FRANK CHURCH,
United States Senate, Washington, D. C.

DEAR SENATOR CHURCH: On January 31, 1958, Chairman Murray and Chavez designated me as acting chairman of a joint hearing, by the Committees on Interior and Insular Affairs and on Public Works. Hearings were held on February 17 and 18 on Senate Resolution 248 on the "Relationship of Water Resources Development Programs of the United States, Russia, and (Red) China."

At the request of Senator Watkins, the record has been held open for the presentation of additional information concerning water-resource programs in the United States.

The recessed hearing has been set for Friday, May 16, at 10 a. m., in room 224, Senate Office Building. Members of both committees are being notified of the date and hour.

As I have a long-standing speaking engagement in New York on that date, I will appreciate your presiding as acting chairman of the joint hearing, in my absence.

Senator Watkins, of course, has been invited to make any statement and present any witnesses he desires to be heard.

Sincerely,

JOSEPH C. O'MAHONEY,
Acting Chairman.

The page proofs of the hearings held on February 17 and 18 on this resolution show that several hundred pages of testimony, statements, and exhibits have been entered in the record so far.

There is a wealth of material in these pages. Practically all of this material comes from official sources, including among other witnesses our colleague, Senator Ellender, and Major General Itschner, Chief of Engineers, United States Army.

Senator O'Mahoney's letter gives the background for today's session.

It is my understanding that the senior Senator from Utah, Mr. Watkins, may desire to make a statement.

Other witnesses listed are Elmer F. Bennett, solicitor, Department of the Interior.

Francis Adams, Chief of Bureau of Power, Federal Power Commission.

George Phillips, Planning Division, Soil Conservation Service, Department of Agriculture.

Senator Watkins?

STATEMENT OF HON. ARTHUR V. WATKINS, A UNITED STATES SENATOR FROM THE STATE OF UTAH

Senator WATKINS. Thank you, Mr. Chairman. I appreciate the opportunity to expand on the record somewhat and I think give a little more complete picture of what has been done in the United States and making some references to preceding testimony that has been given.

In view of my long-standing interest in water resource development, I would like to make a few general remarks relative to this hearing which is being resumed today.

First of all, I would like to commend Chairman Murray for undertaking a committee study—later expanded into a joint committee study—of the comparison of water resource development in this country with that going forward in Soviet Russia and Red China.

Our committees have a justifiable interest in the progress being made in water resource development anywhere in the world, and I hope that we use this study as a basis for continuing serious study of the progress being made, not only in those two countries, but elsewhere.

We have made tremendous contributions in this field in America, but, as we learned from the launching of the sputniks, other countries which we may have considered as backward technologically in the past, have made impressive gains in recent years and may be able to add to our progress or to inspire us to greater effort.

Another advantage of such a study is that it will remind us of the actual progress we have been making in our own country.

My own review of American progress in water resource and power development, for example, in preparation for these hearings, has been a heart-warming rediscovery of how much we have been doing in this field. Sometimes, I have concluded, we do not really discover America, we frequently do not appreciate how well we are really doing until we make a comparative study of how we stand relative to another country that is also expanding.

In requesting permission from Chairman O'Mahoney to present some additional information before these hearings were terminated, I felt that this supplementary testimony should be provided in order to give a more complete picture of water resource and power development in the United States.

I am sorry that Senator O'Mahoney's illness precluded the appearance of my witnesses at a time much nearer to the mid-February hearings, but I am pleased my esteemed colleague has fully recovered, and I greatly appreciate the opportunity to offer this testimony before the record is closed.

Senator CHURCH. Incidentally, it is my understanding that after the witnesses who were scheduled to appear here this morning have been heard, that the record will then be complete and the hearings closed.

Senator WATKINS. So far as I am concerned, yes. I suppose they are all here this morning.

Mr. LINEWEAVER. Yes; they are all here.

Senator WATKINS. In the previous hearing sessions, I felt that some participants and reporters had gleaned the impression that Soviet Russia was going ahead full steam on water and power development, while we in the United States were doing absolutely nothing.

I am sure that none of my colleagues on these two Public Works Committees is laboring under the delusion, but, in order to make it clear in the record, I invited Solicitor Elmer Bennett, of the Department of the Interior, to come before us and discuss the manifold water-resource development activities in that Department.

Supplementary to his remarks, I request permission at this time to introduce at the close of my remarks a summary of new construction starts and resumptions in the Corps of Engineers and the Bureau of Reclamation in the past 5 fiscal years.

Senator CHURCH. That summary may be included in the record of the proceedings following your remarks, Senator Watkins.

Senator WATKINS. Some people who are not members of these committees will be surprised to learn that there have been 461 new starts or resumptions of projects under these 2 programs in that 5-year period. A total of 424 of these new starts were in the corps' civil-works program and 37 in reclamation.

The latter program, incidentally, includes units of one basinwide development—the Colorado River storage project—which was approved in 1956, with multiple-project authorizations included, at a total project cost ceiling of $760 million.

This is the largest single package water-resource project appropriation ever authorized. I do not recall anything comparable to this four-State program described in Russian developments reported to these committees.

These 461 newly initiated projects will be built at a total cost of $5,020,187,000. This means that, in addition to carrying forward a total program costing $3,723,300,000, for the 5 years from 1954 to 1958, we have initiated new projects that will add, roughly, another $5 billion to the costs of completing and operating and maintaining the regular program in these important resource-development fields. And that, my friends, is a very considerable water-resource program.

We who are well informed on what these programs mean to the economic development of this country probably will never feel that even this imposing 5-year program is adequate—and I am one of the supporters of an expanded reclamation program—but I think we should, in all fairness, recognize what we have been doing—especially when we are making comparisons with what is being done in a competing country.

At this point in my remarks, I also introduce a table summarizing new starts in these fields and the annual expenditures, actual and estimated, since 1954:

Annual expenditures for navigation, flood control, and reclamation

[In millions]

Fiscal year	Corps of Engineers	Bureau of Reclamation
1954	$510.8	$196.4
1955	501.2	160.7
1956	533.6	161.0
1957	609.9	170.8
1958 (estimated)	630.0	198.9
1959 (recommended appropriations)	752.9	273.2

New construction starts and resumptions, 1954–58

Year	Total cost of projects			Number of projects		
	Corps of Engineers	Bureau of Reclamation	Total	Corps of Engineers	Bureau of Reclamation	Total
	Thousands	*Thousands*	*Thousands*			
1954	$84,525	$67,412	$151,937	11	3	14
1955	259,437	117,378	376,815	31	10	41
1956	1,527,188	296,284	1,823,472	175	9	184
1957	1,240,946	560,455	1,801,401	150	12	162
1958	856,476	10,086	866,562	57	3	60
Total	3,968,572	1,051,615	5,020,187	424	37	461

Senator WATKINS. As my colleagues are well aware, the foregoing summary covers only two major programs of construction agencies in the public works field. In order that this record may show the very considerable water resource development underway in the Department of Agriculture, I invited Mr. George R. Phillips, Chief of the River Basins Branch of the Soil Conservation Service, to make a statement here. His testimony, I presume, will complement that given by Mr. Bennett.

Activities under the Corps of Engineers were covered rather extensively in the February hearings, so I did not request formal testimony at this time from that agency. However, I did invite the corps to send an observer to this session to answer any pertinent questions that may be brought up by members of these committees.

The final witness whom I invited, by arrangement with Chairman O'Mahoney, is Mr. Francis L. Adams, Chief, Bureau of Power, Federal Power Commission.

Mr. Adams attended the previous sessions as an invited observer, and I requested him to present a summary of existing and planned power development in the United States.

In connection with his appearance, I wish to introduce as part of my remarks two tables on power development in this country, together with explanatory notes.

Senator CHURCH. These tables may be printed in the record at this point.

(The tables referred to follow:)

TABLE I.—*United States total electric power, Dec. 31, 1956*

Ownership	Capacity in megawatts		Annual total generation [1]	
	Total	Hydro	Total	Hydro
Privately owned utilities	91,031	10,944	459.0	55.0
Federal (TVA, Corps of Engineers, U. S. Bureau of Reclamation)	18,336	12,135	100.7	55.9
Municipal	8,179	1,301	28.0	6.1
Power districts of State projects	2,098	1,147	9.5	4.9
REA co-ops	791	40	3.4	.2
Total	120,435	25,567	600.6	122.0
Industrial, railroads, etc.	16,562	----------	83.3	----------
Grand total	136,997	----------	683.9	----------

[1] Billions of kilowatt-hours.

NOTE.—Data from Federal Power Commission.

Table I is an interesting table and it is reliable because the data come from the Federal Power Commission, whose business it is to keep the facts as to our power facilities and our power potentialities and our future needs. Of this 137,000 megawatts of capacity, probably a little less than 20 percent is hydroelectric power. I think most students of power production agree that this ratio will be maintained in the future as we develop the great potential of the Colorado River Basin, the Columbia River Basin, and the Sacramento River Basin. The job is getting pretty well done as to hydroelectric power in the Missouri Basin on the main stem of the river. Work is underway on all of the main-stem plants, and their date of completion is not far distant. These main-stem plants have about two-thirds of the total waterpower potential in the Missouri Basin.

TABLE II.—*Comparison of total electric power [1]—United States and Communist Russia*

Year	Capacities in megawatts		Generation, billions of kilowatt-hours		Ratio [2]	Annual increase in percent	
	United States of America	Communist Russia	United States of America	Communist Russia		United States of America	Communist Russia
1952	97,312	25,250	463.1	119.1	3.9	----------	----------
1953	107,354	28,602	514.2	134.4	3.8	11	13
1954	118,878	32,810	544.6	151.0	3.6	6	13
1955	130,896	37,231	629.0	170.0	3.7	15	12
1956	136,996	42,795	684.0	192.0	3.6	9	13
1957	[3] 146,000	----------	[3] 730.0	210.0	3.5	7	9
1958	[3] 162,000	----------	[3] 810.0	231.0	3.5	11	10
1959	[3] 176,000	----------	[3] 880.0	----------	----------	9	----------
1960	[3] 190,000	----------	[3] 950.0	----------	----------	8	----------

[1] Industrial production included.
[2] Ratio of United States of America generation to Communist Russia generation.
[3] Estimated on basis of Federal Power Commission forecasts.

This table (table II) shows from 1952 to 1960 the actual capacities in the United States of America and in Communist Russia and the total generation including industrial power in both countries year by year through 1956. For the 4 years of 1957–60 inclusive, the values, of course, are estimates, which in the United States are based on forecasts and information from the Federal Power Commission. I have a column in this table marked "Ratio," which shows the ratio of United States electrical generation to that of Communist Russia.

In 1952 the ratio was 3.9. It levels off in 1956, 1957, and 1958 to about 3.5 and seems to hold that level. The percentages in the columns following the "Ratio" column indicate no radical advantage in progress of development by either country.

Remember, now, that we have three and one-half times as much generation. When I look at the data on "world power," as tabulated and analyzed by the Federal Power Commission, I find that in 1956 the United States produced 4,070 kilowatts per capita, while Communist Russia produced 960. So here we have, not a ratio of 3.5 to 1, but a ratio of 4.25 to 1. I also find that United States' generation is about 5,000 kilowatt-hours per kilowatt of capacity. Communist Russia produces slightly under 4,500 kilowatt-hours per kilowatt of capacity. Our plants are more efficient by about 11 percent.

Senator WATKINS. In addition, I also wish to introduce a third table, table III, dealing with the development of irrigation in the United States.

This statistical information was assembled from official sources, as a result of comments made on these two subjects in the February hearings, and I present this information merely to complete the record.

Because of the length of this material, I did not incorporate the text in this statement, but I will attach a copy for the reporter.

That I ask also to be made a part of this hearing.

Senator CHURCH. It may be made a part of the record at this point.

(Table III is as follows:)

TABLE III.—*Irrigation in United States*

[Areas in acres]

Year	17 Western States	Arkansas, Louisiana, Florida	28 States	48 States
1890	3, 631, 559			
1900	7, 542, 782			
1910	[1] 10, 370, 000			
1920	[1] 12, 900, 000			
1930	[1] 14, 000, 000			
1935	[1] 15, 500, 000			
1940	17, 243, 396	699, 572	39, 862	17, 982, 830
1945	19, 431, 367	1, 046, 200	61, 903	20, 539, 470
1950	24, 270, 566	1, 364, 300	152, 589	25, 787, 455
1955	[2] 26, 970, 689	1, 993, 488	587, 978	29, 552, 155

[1] Estimated. Published value corrected for drought conditions, for duplications, or supplied for lack of detailed data.

[2] Of this total, Bureau of Reclamation says its projects cover 6,126,000 acres.

Source: Bureau of the Census, except as noted.

This table (table III) shows irrigation in the United States, as reported by the Bureau of the Census, or as partially estimated to bring the data to comparable values in column 1, where the method of census taking was somewhat different or there was no census. This is indicated in a footnote in the table.

The matter of programs for increasing irrigated acreages in the United States as compared to the programs in the Iron Curtain countries is not a subject on which comparisons are either valid or informatory. We are a nation having an agricultural surplus, while the Iron Curtain countries always had deficiencies in food and fiber of catastrophic characteristics. Table III shows that in some 60 years irrigation has increased 26 million acres. Most of this increase is, of course, in the arid and semiarid States for which the Reclamation Act of 1902 was adopted. In these 17 Western States lies over 60 percent of our continental land area. More recently the Bureau of the Census had recognized Arkansas, Louisiana, and Florida as being important in the irrigation program. I also direct attention to the increase of over 400,000 acres in irrigation in other States exclusive of the 20 I have mentioned. For the information of those interested, this irrigation is chiefly in New Jersey,

Pennsylvania, New York, and Massachusetts, and is all privately developed, varying year by year as the seasons require and where rainfall is not always on time to mature specialty food crops. I think this sort of development will continue until there may be as much land irrigated in the 28 States as there is now irrigated in the West, but it will be a different kind of irrigation; a sprinkler type of irrigation used for only a few days or a few weeks on the average during each growing season.

In 1955 the total area irrigated in the United States was, in round numbers, 29,500,000 acres This included about 600,000 acres in the 28 Eastern States, about 2 million acres in Arkansas, Louisiana, and Florida, and about 27 million acres in the 17 Western States in which the Bureau of Reclamation operates under the Reclamation Act of 1902. Thus the report, which indicates an irrigation of 7 million acres in the 55 years since 1902, does not show the full picture in the 17 Western States. According to the Bureau of Reclamation, the Federal reclamation projects in 1955 include only 6,126,000 acres of the total of 27 million, about 23 percent. So most of our irrigation has come about as the result of private endeavors chiefly in irrigation districts organized as public bodies under the laws of the Western States. Here are works not financed by Federal appropriations and they are not now a part of the Federal reclamation program. In most of these areas, however, farmers have the benefit of technical advice and aid from the Department of Agriculture.

I want to point out also that the increase in irrigated acreage in the United States from 1945 to 1955 exceeded 9 million acres, nearly 1 million acres per year.

EXPLANATION OF ESTIMATED FIGURES IN TABLE III

1. Irrigation items in the 17 Western States, as they appear in table III, were, as is noted in a footnote thereon, estimated from records published by the Bureau of the Census. In 1910 and 1920 the total acreages irrigated were not given, but the number of irrigated farms was given on the same basis that irrigated farms were given in other census years. In 1900 the average acres per irrigated farm were 69.0; in 1930 it was 54.5. It was estimated, therefore, that it would be reasonable to use for 1910, 65 acres and for 1920, 60 acres. These values, multiplied by the number of farms given, result in the figures in the table.

2. For the year 1930 the acreage of irrigated land included some duplication, because two or more crops were harvested from the same land. A small correction was therefore made in that year.

3. In 1935 the figure in the census reported only areas from which crops were harvested. The figure excluded, therefore, items like irrigated pastures, irrigated areas where there were crop failures due to lack of water to mature the crop, etc. A round number was therefore adopted for 1935 to make the column of table III appear somewhat logical.

4. In no instance, however, do these estimated values enter into any conclusions or comparisons which have been used.

Senator WATKINS. Mr. Chairman, in closing, I wish to direct the attention of these committees to two studies of comparative economic development in the United States and Russia, made by the Joint Economic Committee.

Senator Goldwater and Senator O'Mahoney, I believe, are the only other members of these committees now in session who participated in the joint committee which made these studies, hence our other colleagues may not be so familiar with these painstaking economic studies.

However, in view of the fact that these two studies included considerable economic analyses of the areas covered in our much more specialized review, I hereby request consent to incorporate by reference the comparative studies of the Joint Economic Committee on this matter. They are entitled:

"Trends in Economic Growth: A Comparison of the Western Powers and the Soviet Bloc," 83d Congress, 2d session, and

"Soviet Economic Growth: A Comparison With the United States," 85th Congress, 1st session.

Both studies were conducted by the Legislative Reference Service of the Library of Congress, employing some 40 authorities on economics and Russia, supplemented by hearings and staff analysis by the Joint Economic Committee.

In order that the record may contain the gist of the conclusions in this important study, I also request consent to have printed in this record pertinent excerpts from these two thoroughgoing studies, if I may have that permission.

Senator CHURCH. That permission is granted.

Senator WATKINS. Mr. Chairman, that completes my opening statement. You may call the scheduled witnesses in any order you wish.

Thank you for this courtesy.

(The excerpts from the Joint Economic Committee study appear in the appendix on pp. 274–291.)

(The tables on new starts and resumptions referred to by Senator Watkins are as follows:)

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1954

	Estimated total cost (thousands of dollars)
Navigation:	
Humboldt Harbor, Calif.[1]	3,284
Canaveral Harbor jetties, Florida	648
Green River locks and dams Nos. 1 and 2, Kentucky	9,370
Northeast Harbor, Maine	139
St. Anthony Falls, Minn.[1]	33,300
Gowanus Creek, N.Y.	202
New York-New Jersey Channels (middle reach)	23,352
Alternate route, south Galveston Bay, Tex	196
Craney Island disposal area, Norfolk Harbor, Va	6,500
Subtotal	76,991
Flood control:	
Merced stream group, California [1]	2,754
Lake Pontchartrain, La	4,780
Subtotal	7,534
Grand total, 1954 (11)	84,525

NEW STARTS, FISCAL YEAR 1955

Navigation:	
Warrior lock and dam, Alabama	12,638
Kodiak Harbor, Alaska	1,440
Crescent City Harbor, Calif.[1]	5,122
San Diego River and Mission Bay (entrance channel), California [1]	750
San Joaquin River, Stockton turning basin, California	335
Housatonic River, Conn	650
Calumet Harbor and River, Ill. (widening at bend)	110
Missouri River—Omaha to Sioux City—Decatur Bridge reach, Iowa	11,000
Greenup lock and dam, Kentucky	62,200
Plaquemine-Morgan City Route, La	24,800
Portland Harbor, Maine	1,150
Duluth-Superior Harbor, Minn	479
Buffalo Harbor, N. Y	16,740
Fairfield, N. C	196
New Cumberland locks and dam, Ohio	43,500

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1955—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Port Aransas-Corpus Christi Waterway (Tule Lake), Tex	1,742
Quinby Creek, Va	48
Subtotal	182,899
Beach erosion: Jennings Beach, Conn	15
Flood control:	
Little Missouri River below Murfreesboro, Ark	354
Ozan Creek, Ark	60
Beardstown, Ill	4,970
Coralville Reservoir, Iowa	15,160
Toronto Reservoir, Kans	14,700
Barbourville, Ky	1,780
Anacostia River, Md. and D. C	5,610
Adams, Mass	6,000
Yazoo River, lower auxiliary channel, Mississippi	12,300
West Atchafalaya Basin Floodway levee, Louisiana	1,712
Batavia, N. Y	335
Johnsonburg, Pa	1,742
Ferrells Bridge Reservoir, Tex	11,800
Subtotal	76,523
'Grand total, 1955 (31)	259,437

NEW STARTS—FISCAL YEAR 1956

Navigation:	
Bayou Coden, Ala	5
Bayou La Batre, Ala	79
Dauphin Island Village Channel, Ala	68
Dauphin Island-Fort Gaines Channel, Ala	4
Mobile Harbor, Ala	6,388
Metlakatla Harbor, Alaska	289
Petersburg Harbor, Alaska	179
Wrangell Harbor, Alaska	376
Seward Harbor, Alaska	137
Playa del Rey Harbor, Calif	3,840
Redondo Beach Harbor, Calif	4,620
Richmond Harbor, Calif	2,459
Sacramento River deepwater channel, California [1]	41,000
Guilford Harbor, Conn	150
Mystic River, Conn	150
Patchogue River, Conn	150
Stonington Harbor, Conn	41
Westcott Cove, Conn	56
Westport Harbor, Conn	4
Delaware River, Philadelphia to the sea, Delaware, New Jersey, Pennsylvania [1]	3,870
Indian River Inlet to Rehoboth Bay, Del	91
Inland Waterway between Rehoboth Bay and Delaware Bay, Del	865
Mispillion River, Del	504
Nanticoke River, Del	94
Apalachicola Bay channel, St. Georges Sound, Fla	613
Apalachicola River channel improvement, Florida	1,361
Big Lagoon, Pensacola Bay, Fla	106
New River Channel, Fla	37
Rice Creek Channel, Fla	85
St. Augustine Harbor, Fla	1,263
Tampa Harbor, Fla	12,000
Nawiliwili Harbor, T. H	950

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS—FISCAL YEAR 1956—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Calumet Harbor and River (channel widening) Illinois	179
Illinois Waterway, Calumet-Sag, Ill	79,100
Rock Island Harbor, Ill	31
Wabash River bridges, Meredosia, Ill	2,820
Indiana Harbor, Ind. (Youngstown Sheet & Tube area)	45
Markland lock and dam, Indiana	71,300
Fort Madison Harbor, Iowa	13
Green River Channel, Ky	1,965
Bayou La Loutre, La	53
Atchafalaya River navigation, Louisiana	303
Beals Harbor, Maine	135
Hendricks Harbor, Maine	28
Isle au Haut, Maine	96
Lubec Channel, Maine	77
Wood Island Harbor and Pool at Biddeford, Maine	153
Channel to Island Creek, St. George Island, Md	24
Honga River and Tar Bay, Md	38
Little Creek, Md	23
Rhodes Point to Tylerton, Md	35
Rock Hall Harbor, Md	62
St. Patricks Creek, Md	16
Twitch Cove, Md	29
Lynn Harbor, Mass	1
Mystic River, Mass	2,600
Town River, Mass	672
Black River Harbor, Mich	328
Crooked and Indian Rivers, Mich	330
Port Austin Harbor, Mich	1,250
St. James Harbor, Mich	53
St. Marys River (Bridge Island), Mich	5,080
Black River Harbor, Mich	328
St. Joseph Harbor, Mich	116
Hastings Harbor, Minn	77
Knife River Harbor, Minn	258
Winona (Crooked Slough Harbor), Minn	85
Mississippi River at Louisiana, Mo. (damages)	83
Portsmouth Harbor and Piscataqua River, N. H. and Maine	1,173
Staten Island Rapid Transit Bridge, New Jersey and New York	8,160
Little River at Cayuga Island, N. Y	21
Northport Harbor, N. Y	79
Back Sound to Lookout Bight, N. C	64
Beaufort Harbor, Taylors Creek, N. C	68
Manteo Bay, N. C	1,400
Rollinson Channel breakwater, North Carolina	175
Rollinson Channel (6-foot channel at Hatteras), N. C	34
Smiths Creek, N. C	99
Wallace Channel, N. C	114
Wilmington Harbor, N. C	1,600
Ashtabula Harbor, Ohio	4,400
Fairport Harbor, Ohio	28
Columbia River at the mouth, Oregon	10,340
Coos Bay, Oreg	486
Smith River, Oreg	143
Tillamook Bay and Bar, Oreg	1,200
Umpqua River, Oreg	54
Charleston Harbor, S. C	200
Port Royal Sound to Beauford, S. C	1,229
Brady Island Channel, Tex	28
Corpus Christi Bridge, Tex	4,790
Houston Ship Channel, Tex	8,480

Corps of Engineers, civil functions, projects

NEW STARTS—FISCAL YEAR 1956—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Pass Cavallo-Red Bluff, Tex	139
Turtle Cove, Tex	61
Davis Creek, Va	98
Deep Creek, Va	190
Norfolk and Portsmouth Belt Line Bridge, Va	2,340
Quinby Creek, Va	56
Totuskey Creek, Va	130
Urbanna Creek, Va	17
Whitings Creek, Va	22
Winter Harbor, Va	171
Anacortes Harbor, Wash	150
Grays Harbor and Chehalis River, Wash. (30-foot channel)	261
Neah Bay and Harbor, Wash	123
Tacoma Harbor, Wash	542
Hildebrand lock and dam, West Virginia	13,200
Cornucopia Harbor, Wis	230
Sheboygan Harbor, Wis	202
Subtotal	311,917
Beach erosion:	
Burial Hill Beach, Conn	10
Compo Beach, Conn	90
Gulf Beach, Conn	25
Hammonsett Beach, Conn	163
Middle Beach, Conn	12
Prospect Beach, Conn	105
Sasco Hill Beach, Conn	22
Seaside Park, Conn	150
Sherwood Island State Park, Conn	169
Southport Beach, Conn	20
Winthrop Beach, Mass	340
Hampton Beach, N. H	125
Atlantic City, N. J	2,343
Cold Spring Inlet, N. J	263
Ocean City, N. J	122
Presque Isle Peninsula, Pa	817
Virginia Beach, Va	580
Subtotal	5,356
Flood control:	
Painted Rock Reservoir, Ariz	19,000
Devil E. Twin, Warm and Lytle Creeks, Calif	14,300
Riverside, Calif	2,100
Russian River Reservoir, Calif	13,002
San Antonio and Chino Creeks, Calif	12,300
San Joaquin River and tributaries, California	11,900
Hartford (Folly Brook), Conn	370
Portneuf River and Marsh Creek, Idaho (Pocatello unit)	1,260
Little Sioux River, Iowa	15,500
Tuttle Creek Reservoir, Kans.[1]	92,300
Catlettsburg, Ky	4,150
Jackson, Ky	152
Rough River Channels and Reservoir, Ky	9,080
Old River control, Louisiana	80,000
Barre Falls Reservoir, Mass	2,060
Buffumville Reservoir, Mass	2,800
North Adams, Mass [1]	15,600
Big Sunflower, Miss	7,920
Yazoo Basin, major tributaries, Mississippi	27,700

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS—FISCAL YEAR 1956—continued

	Estimated total cost (thousands of dollars)
Flood control—Continued	
Cape Girardeau, Mo	5,800
Carthage, Mo	383
East Poplar Bluff and Poplar Bluff, Mo	307
Saco, Mont	71
Otter Brook Reservoir, N. H	3,950
Chamita (Abiquiu) Reservoir, N. Mex	19,400
Wellsville, N. Y	1,014
Pasquotank River, N. C	53
Markham Ferry Reservoir, Okla. (contribution)	6,300
Oologah Reservoir, Okla	31,400
Bear Creek Reservoir, Pa	11,700
Bradford, Pa	8,200
Woonsocket, R. I	4,800
McCook Lake, S. Dak	150
Sioux Falls, S. Dak	4,300
Reelfoot Lake, Tenn	652
Canyon Reservoir, Tex	14,000
Ball Mountain Reservoir, Vt	10,900
Castle Rock, Wash	101
Eagle Gorge Reservoir, Wash	27,700
Sutton Reservoir, W. Va.[1]	33,400
Greybull, Wyo	340
Subtotal	516,415
Multiple purpose with power:	
Fort Gaines lock and dam, Alabama	85,500
Dardannelle Reservoir, Ark	94,600
Hartwell Resevoir, Ga. and S. C	93,000
Eufaula Reservoir, Okla	154,000
Cougar Reservoir, Oreg	41,400
Hills Creek Reservoir, Oreg	40,000
McGee Bend Dam, Tex	50,000
Ice Harbor lock and dam, Washington	135,000
Subtotal	693,500
Grand total, 1956 (175)	1,527,188

NEW STARTS, FISCAL YEAR 1957

Navigation:	
Fly Creek, Ala	29
Jackson lock and dam, Ala	23,600
Craig Harbor, Alaska	365
Elfin Cove, Alaska	173
Ketchikan Harbor, Alaska	1,915
Kodiak Harbor, Alaska	1,440
Pelican Harbor, Alaska	362
Valdez Harbor, Alaska	116
Los Angeles-Long Beach Harbor, Calif	485
San Diego River and Mission Bay, Calif.[1]	10,100
San Joaquin River (Stockton Channel bank protection) Calif	2,226
West Basin Bridge, Calif	120
Eight Mile Run, Conn	1
Summit Bridge, Del	8,250
Anclote River, Fla	68
Apalachicola Bay Channel at Eastpoint and at Scipio Creek, Fla	45
Intracoastal Waterway, Jacksonville to Miami, Fla.[1]	19,600
St. Petersburg Harbor, Fla	22
Vero Beach Basin, Fla	27

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1957—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Savannah Harbor, Ga	415
Kawaihae Harbor, T. H	5, 530
Mississippi River regulating works, Ill.[1]	59, 300
Lansing Harbor, Iowa	9
Lock and dam 41, Kentucky	50, 400
Bayou Segnette Waterway, La	374
Franklin Canal, La	35
Rockland Harbor, Maine	1, 210
Scarboro River, Maine	205
Crisfield Harbor, Md	102
Lowes Wharf Anchorage, Md	21
Queenstown Harbor, Md	28
Wicomico River, Md	14
St. Catherines Sound, Md	30
Boston Harbor (40-foot anchorage) Mass	5, 400
Cape Cod Canal, Mass	197
Chatham (stage) Harbor, Mass	302
Fall River Harbor, Mass	2, 000
Falmouth Harbor, Mass	128
Nantucket harbor of refuge, Massachusetts	344
Newburyport Harbor, Mass	143
Weymouth Fore River, Mass	6, 245
Cheboygan Harbor, Mich	110
Chippewa Harbor, Mich	110
Eagle Harbor, Mich	87
Great Lakes connecting channels, Mich	141, 000
Harrisville Harbor, Mich	1, 480
Holland Harbor, Mich	626
Houghton-Hancock Bridge, Mich	4, 930
Whitefish Point Harbor, Mich	840
Winona Harbor, Minn	87
Vicksburg Harbor, Miss	4, 060
Hannibal Harbor, Mo	93
Delaware River, Philadelphia to Trenton, Pa. and N. J	111, 900
Shoal Harbor and Compton Creek, N. J	77
Sandy Hook Bay at Leonardo, N. J	94
Absecon Inlet, N. J	99
Barcelona Harbor, N. Y	1, 150
Great Lakes-Hudson River Waterway, N. Y[1]	38, 950
Jones Inlet, N. Y	1, 780
Oswego Harbor, N. Y	2, 900
Channel around Harkers Island, N. C	87
Far Creek, N. C	179
Masonboro Inlet, N. C	426
Pamlico Sound to Beaufort, Marshallberg, N. C	23
Pamlico Sound and Beaufort Harbor at sea level, North Carolina	12
Toledo Harbor, Ohio	380
Chetco River, Oreg	425
Entrance, Oregon Slough, Oreg	103
Garibaldi smallboat basin, Oregon	111
Skipanon Channel, Oreg	157
Umpqua River, Scholfield, Oreg	4
Bullocks Point Cove, R. I	174
Sakonnet Harbor, R. I	600
Aransas Pass Channel, Tex	15
Brazos Island Harbor, Tex	6, 260
Guadalupe River, channel to Victoria, Tex. (side channel to Seadrift)	113

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1957—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Port Aransas-Corpus Christi Waterway, Tex.:	
(*a*) 36-foot channel	4,950
(*b*) Channel to La Quinta	536
Sabine-Neches Waterway, Tex	9,700
Deep Creek, Va. (7-foot channel)	83
Kings Creek, Va	144
Oyster Creek, Va	65
Parrotts Creek, Va	37
Thimble Shoals Channel, Va	1,300
Waterway, coast of Virginia	1,030
Bellingham Harbor, Wash	1,450
Blaine Harbor, Wash	471
Columbia River at Baker Bay, Wash	601
Everett Harbor and Snohomish River, Wash	436
Grays Harbor and Chehelis River, Wash. (Westhaven breakwater)	371
Quillayute River, Wash	537
Shilshole Bay, Wash	2,300
Willapa River and Harbor and Naselle River, Wash	955
Milwaukee Harbor, Wis	317
Subtotal	546,101
Beach erosion:	
Revere Beach, Mass	430
Sand Hill Cove, R. I	90
Subtotal	520
Flood control:	
Gold Creek, Alaska	428
Calion, Ark	840
American River levees, California	2,590
Sacramento River, major and minor tributaries, California [1]	22,000
San Lorenzo River, Calif	3,879
Success Reservoir, Calif	14,400
Terminus Reservoir, Calif	23,100
Thomaston Reservoir, Conn	17,500
Blackfoot area, Snake River, Idaho	41
New Harmony Bridge, Illinois	680
Mansfield Reservoir, Ind	7,970
Muscatine, Iowa	906
Sabula, Iowa	429
Upper Iowa River, Iowa	943
Abilene, Kans	830
Salina, Kans	2,190
Topeka, Kans	16,230
Buckhorn Reservoir, Ky	10,600
Amite River and tributaries, Louisiana	3,128
East Brimfield Reservoir, Mass	7,300
Hodges Village Reservoir, Mass	5,300
Worcester, Mass	5,270
Battle Creek, Mich	6,170
Canton, Mo	$1,060
Pomme de Terre Reservoir, Mo	18,700
Belzoni, Miss	285
Yazoo River, main stem, Mississippi	19,800
Arkabutla Reservoir (U. S. Highway 51) Miss	591
Billings, Mont	4,150

[1] Resumption—project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1957—continued

	Estimated total cost (thousands of dollars)
Flood control—Continued	
Matthews Canyon Reservoir, Nev	780
Pine Canyon Reservoir, Nev	920
Endicott, Johnson City, and Vestal, N. Y	6,100
Marmarth, N. Dak	260
Dillon Reservoir, Ohio [1]	29,400
Keystone Reservoir, Okla	137,000
Amazon Creek, Oreg	1,183
Johnson Creek, Oreg	535
Malheur Improvement District, Oreg	56
Dyberry Reservoir, Pa	4,500
Prompton Reservoir, Pa	5,000
Reynoldsville, Pa	421
Stillwater Reservoir, Pa	9,000
San Antonio Channel, Tex	15,380
East Barre Reservoir, Vt	2,200
North Springfield Reservoir, Vt	9,850
Townshend Reservoir, Vt	10,200
Waterbury Reservoir, Vt	800
Wrightsville Reservoir, Vt	1,175
Jackson Hole, Wyo	2,360
Subtotal	434,490
Multiple purpose with power:	
Greers Ferry Reservoir, Ark	52,100
Barkley lock and dam, Kentucky	174,000
Fort Peck (2d powerplant), Mont	27,200
Denison Reservoir, Tex.	
(a) Recreational facilities	599
(b) Highway bridge at Willis	5,936
Subtotal	259,835
Grand total, 1957 (150)	1,240,946

NEW STARTS, FISCAL YEAR 1958

Navigation:	
Dry Pass, Alaska	1,720
Rocky Pass-Keku Strait, Alaska	333
Charlotte Harbor, Fla	170
Horseshoe Cove, Fla	244
Savannah River below Augusta, Ga	3,560
New Richmond lock and dam, Kentucky	74,300
Baton Rouge Harbor, La	2,860
Mississippi River-Gulf outlet, Louisiana	95,900
Cambridge Harbor, Md	90
Gloucester Harbor, Mass	205
Hyannis Harbor, Mass	278
Wellfleet Harbor, Mass	303
Au Sable Harbor, Mich	160
Lac La Belle Harbor, Mich	347
Manistique Harbor, Mich	488
Saginaw River, Mich	5,990
Black Rock Channel, N. Y	319
Great South Bay, N. Y	190
Columbia River-Chinook to Sand Island, Oreg	227
Dam 8, Monongahela River, Pa	3,840
Erie, Pa	185

[1] Resumption: Project cost includes amounts previously appropriated.

Corps of Engineers, civil functions, projects

NEW STARTS, FISCAL YEAR 1958—continued

	Estimated total cost (thousands of dollars)
Navigation—Continued	
Galveston seawall, Texas	9,210
Gulf Intracoastal Waterway	
(*a*) Guadalupe River, channel to Victoria, Tex	7,908
(*b*) Realined route, vicinity of Aransas Pass, Tex	2,950
Norfolk Harbor, Va	5,510
Port Angeles Harbor, Wash	396
Prairie du Chien Harbor, Wis	225
Subtotal	217,908
Flood control:	
Whitlow Ranch Reservoir, Ariz	4,620
Conway County drainage and levee district, Arkansas	250
Maniece Bayou, Ark	146
Walnut Bayou, Ark	800
Carbon Canyon Reservoir, Calif	5,820
Middle Creek, Calif	1,400
San Lorenzo Creek, Calif	4,412
Kendrick, Potlatch River, Idaho	62
Shelley Area, Snake River, Idaho	35
Carlyle Reservoir, Ill	33,270
Ottawa, Kans	3,380
Waterloo, Nebr	167
Hopkinton-Everett Reservoir, N. H	34,400
Albuquerque, N. Mex	10,169
Artesia, N. Mex	720
Lower Heart River, N. Dak	1,750
Roseville, Ohio	1,070
Multnomah drainage district No. 1, Oregon	2,210
Pendleton, Oreg	446
Allegheny River Reservoir, Pa	101,000
Allentown, Pa	2,210
Lake City, Tenn	655
Cooper Reservoir, Tex	13,350
Kenedy, Tex	166
Waco Reservoir, Tex	43,450
Salt Lake City, Utah	1,720
North Hartland Reservoir, Vt	11,800
Sheridan, Wyo	2,590
Subtotal	282,068
Multiple purpose with power:	
Bull Shoals Reservoir (2 power units)	6,500
John Day lock and dam, Oregon	350,000
Subtotal	356,500
Grand total, 1958 (57)	856,476

Bureau of Reclamation projects

NEW CONSTRUCTION STARTS

	Estimated total cost (thousands of dollars)
Fiscal year 1954:	
Avondale project, Idaho	222
Central Valley project, Sacramento Canal division, California	66,922
Dalton Gardens project, Idaho	268
Subtotal, 1954 (3)	67,412
Fiscal year 1955:	
Carlsbad project, New Mexico	1,471
Crescent Lake Dam project, Oregon	297
Middle Rio Grande project, New Mexico	32,837
Minidoka project, North Side Pumping Division, (unit B), Idaho	2,500
Missouri River Basin project:	
Bostwick Division, Lovewell Dam, Kans	6,178
Glendo Unit, Wyoming	44,255
Hanover-Bluff Unit, Wyoming	3,352
Helena Valley Unit, Montana	11,645
Sargent Unit, Nebraska	14,367
Yuma Auxiliary project, Arizona	476
Subtotal, 1955 (10)	117,378
Fiscal year, 1956:	
Central Valley project, Trinity River Division, California	262,000
Chief Joseph Dam project, Foster Creek Division, Washington	3,338
Deschutes project, Haystock equalizing reservoir, Oregon	1,600
Michaud Flats project, Idaho	4,350
Missouri River Basin project:	
Owl Creek Unit, Wyoming	4,569
Palo Verde project, Arizona-California	4,917
Provo River project, Deer Creek powerplant, Utah	1,067
Santa Maria project, California	12,040
Yakima project, Roza Division, Roba powerplant, Washington	2,403
Subtotal, 1956 (9)	296,284
Fiscal year 1957:	
Collbran project, Colorado	14,190
Colorado-Big Thompson project, Big Thompson powerplant, Colorado	1,136
Colorado River storage project:	
Flaming Gorge Unit, Utah	66,591
Glen Canyon Unit, Arizona	325,704
Navajo Unit, New Mexico	42,372
Loans to construct distribution systems	12,700
Rathdrum Prairie project, Hayden Lake Division, Idaho	520
Rogue River Basin, Talent Division, Oregon	23,700
Savage Rapids Dam, fish protective facilities, Oregon	208
Ventura project, California	31,000
Washita project, Oklahoma	40,300
Weber Basin project, Wanship and Gateway power facilities, Utah	2,034
Subtotal, 1957 (12)	560,455
Fiscal year 1958:	
Little Wood River project, Idaho	2,212
Crooked River project, Oregon	7,293
Wapinitia project, Oregon	581
Subtotal, 1958 (3)	10,086
Total reclamation projects (37)	1,051,615

Summary, Corps of Engineers-Bureau of Reclamation—New construction starts and resumptions, 1954–58

Year	Total cost of projects			Number of projects		
	Corps of Engineers	Bureau of Reclamation	Total	Corps of Engineers	Bureau of Reclamation	Total
	Thousands of dollars	*Thousands of dollars*	*Thousands of dollars*			
1954	$84,525	$67,412	$151,937	11	3	14
1955	259,437	117,378	376,815	31	10	41
1956	1,527,188	296,284	1,823,472	175	9	184
1957	1,240,946	560,455	1,801,401	150	12	162
1958	856,476	10,086	866,562	57	3	60
Total	3,968,572	1,051,615	5,020,187	424	37	461

Senator CHURCH. Senator Watkins, owing to another committee engagement that I must meet at 10:30, I would like to invite you to preside this morning and call on the witnesses in whatever order you care to call them.

Senator WATKINS. I shall be very happy to do that.

I would much appreciate it, of course, if you would stay, but I would like to extend an invitation to my colleagues on both committees to read the record that we are now making.

Senator CHURCH. I am sure they will do so, Senator. If you will take over and preside this morning I will appreciate it very much.

Senator WATKINS (presiding). Thank you.

Mr. Elmer Bennett is the next witness.

STATEMENT OF ELMER F. BENNETT, SOLICITOR, DEPARTMENT OF THE INTERIOR

Mr. BENNETT. Mr. Chairman, we appreciate the opportunity to appear before this committee on the subject matter of Senate Resolution 248.

Our objective, because of the fact that so much of the budgetary material on governmental programs is available, has been to make a statement which we believe puts the developments in Russia, as well as our own developments, in the proper perspective.

I would like to make that clear before I proceed.

A major role of the Department of the Interior is the conservation and development of water resources in the United States. It is naturally greatly concerned that conservation and development measures serve the best interests of this country both in the economic and social sense.

Adequacy of conservation and development must be weighed in our national economic context and in the more complex scene of international competition.

The efforts of the U. S. S. R. to develop its water resources are of interest to this department not only because of their technical accomplishments, but also because of their effects upon Russian capabilities for competing in the worldwide struggle for national security, sometimes called the cold war.

The United States must not risk losing this struggle.

Many competent observers believe that this world struggle may be resolved on the economic front. The relative stalemate in military

and political fields has resulted in an emphasis on dynamic economic measures. Both the Iron Curtain countries and the free world desire to succeed in this phase of the conflict.

Nevertheless, direct comparison of the United States accomplishments in water resources development with those of the U. S. S. R. or with those of Red China can be very misleading.

It is important that we take into account our relatively different positions with regard to water resources.

I would not want to be understood as reflecting a complacent attitude on economic development in Soviet Russia. There can be no question but what greater stress than ever is being laid by the Soviets on the development of an economic and industrial base from which to conduct a program of economic penetration.

Khrushchev has been quoted as stating their goal to be:

> Catching up and surpassing the United States in per capita production within the shortest possible historical period of time.

This concept provides both internal propaganda and the propagation of the Communist faith elsewhere.

There is little doubt of the high rate of economic growth in Russia. In 1950 their gross national product was about one-third of ours.

In 1952 it may be about one-half of ours, according to expert observers.

The committee print notes many reports of Soviet progress in the field of water development. Let us also note progress in the United States under the American way of life.

In the field of power production, despite reported large percentage increases in U. S. S. R. production, their annual net per capital power consumption in 1956 was about 900 kilowatt-hours, while in the United States it was about 4,070 kilowatt-hours.

Electric power generating capacity in the United States in 1956 was more than 3 times the capacity of the U. S. S. R., and the total power generation in the United States was likewise more than 3 times that of the U. S. S. R. (See table II.)

In the United States, almost four-fifths of the generating capacity is thermal, since our potential hydroelectric capacity would supply only a relatively small proportion of our power requirements, even if all economically feasible hydroelectric power sites were fully developed.

It has not been the policy of the Federal Government to build thermal electric plants, except experimental nuclear plants or steam plants to firm up Federal hydro plants in the TVA region. Most of the power-generation facilities in the United States, therefore, are owned by private power companies, municipalities, public utility districts, or State power authorities, as opposed to complete central Government ownership in the U. S. S. R. (See table I.)

(Table I is as follows:)

TABLE I.—*United States total electric power industry, Dec. 31, 1956*

Ownership	Capacity in megawatts		Annual total generation [1]	
	Total	Hydro	Total	Hydro
Privately owned utilities	91,031	10,944	459.0	55.0
Federal (TVA, Corps of Engineers, U. S. Bureau of Reclamation)	18,336	12,135	100.7	55.9
Municipal	8,179	1,301	28.0	6.1
Power districts of State projects	2,098	1,147	9.5	4.9
REA co-ops	791	40	3.4	0.2
Total	120,435	25,567	600.6	122.1
Industrial, railroads, etc.	16,562		83.3	
Grand total	136,997		683.9	

[1] Billions of kilowatt-hours.

NOTE.—Data from Federal Power Commission.

Mr. BENNETT. During the 6-year period, 1952–58, the power-generating capacity and the generation of electric power in both the United States and the U. S. S. R. increased significantly. The percentage increase in capacity in the U. S. S. R. was somewhat greater than in the United States.

Total generation in individual years in the United States, however, ranged from between 3.5 to 3.9 times the generation in the U. S. S. R. during this period, with no significant downward trend. (See table II.)

(Table II is as follows:)

TABLE II.—*Comparison of total electric power industry, United States and Communist Russia*

Year	Capacities in megawatts		Generation (billion kilowatt-hours)		Annual increase in percent		
	United States	Communist Russia	United States	Communist Russia	Ratio [1]	United States	Communist Russia
1952	97,312	25,250	463.1	119.1	3.9		
1953	107,354	28,602	514.2	134.4	3.8	11	13
1954	118,878	32,810	544.6	151.0	3.6	6	13
1955	130,896	37,231	629.0	170.0	3.7	15	12
1956	136,996	42,795	684.0	192.0	3.6	9	13
1957	[2] 146,000		[2] 730.0	210.0	3.5	7	9
1958	[2] 162,000		[2] 810.0	231.0	3.5	11	10
1959	[2] 176,000		[2] 880.0			9	
1960	[2] 190,000		[2] 950.0			8	

[1] Ratio of United States generation to Communist Russia generation.
[2] Estimated on basis of FPC forecasts.

Mr. BENNETT. Soviet irrigation is reported to have expanded, yet that country is still experiencing an inadequate diet while the United States has exportable surpluses.

The relative aridity of the U. S. S. R. places a greater importance on irrigation in that country. Most of the good land in that country is in a semiarid climatic zone. Even so, the area of irrigated land in the United States still exceeds the 11 million hectares—about 25

million acres—reported in the committee print as irrigated in the U. S. S. R. in 1956.

According to the Bureau of the Census, 29,552,000 acres were irrigated in the United States in 1955. Of this area, almost 27 million acres were in the 17 Western States, and of the 17 State total, 6,126,000 were in Bureau of Reclamation projects.

The irrigated area in the United States has increased steadily. In 1955 it was eight times the irrigated area in 1890. The acreage increase during the 10-year period, 1945–55, was greater than in any previous 10-year period. (See table III.)

TABLE III.—*Irrigation in United States*

[Area in acres]

Year	17 Western States	Louisiana, Arkansas, Florida	28 States	48 States
1890	3,631,559			
1900	7,542,782			
1910	[1] 10,370,000			
1920	[1] 12,900,000			
1930	[1] 14,000,000			
1935	[1] 15,500,000			
1940	17,243,396	699,572	39,862	17,982,830
1945	19,431,367	1,046,200	61,903	20,539,470
1950	24,270,566	1,364,300	152,589	25,787,455
1955	[2] 26,970,689	1,993,488	587,978	29,552,155

[1] Estimated. Published value corrected for drought conditions, for duplications, or supplied for lack of detailed data.
[2] Of this total, Bureau of Reclamation says its projects cover 6,126,000 acres.

Source: Bureau of the Census, except as noted.

Mr. BENNETT. Correspondingly, while Russia has expanded her inland navigation facilities, it still does not have a transportation system comparable to ours. By their own reports there appears to be underutilization of the newly built facilities as, for example, the Volga-Don Canal.

It has no highway network worthy of the name.

In the United States the transportation of goods and people is one of the outstanding features of our economy. Our highway network has no counterpart in Russia and China, yet we are embarking upon a major improvement of the system. This will include over 41,000 miles of superhighway.

Our railroad system, unsurpassed throughout the world, has approximately 3 times the mileage of theirs, even though their land area far exceeds our own.

United States efforts to relieve the water pollution problem finds no counterpart in Russia. We are insuring sound water conservation, while in contrast water pollution in the U. S. S. R., particularly industrial pollution, is reported to be very serious.

Municipal water supplies in this country now serve roughly 72 percent of the population with ample quantities of safe water.

In the U. S. S. R. domestic water service is notoriously inadequate by American standards.

Between 1947 and 1956 we built in the United States over 115,000 acre-feet of reservoir capacity, a gain of 71 percent in these facilities for water conservation. These data do not include reservoirs of less

than 5,000 acre-feet capacity, of which there were many. This kind of water development and conservation can hardly be viewed as laggard.

The United States has made great efforts to protect fishery resources especially in the Columbia River Basin.

On the other hand, it is a matter of record that the Volga development and industrial pollution have done great harm to Caspian fisheries.

The United States has major programs of flood protection and control which have saved much loss of life and untold millions of dollars in property loss.

The U. S. S. R. has no counterpart programs. Instead, it takes either its losses or arbitrarily decrees flood zoning to eliminate the flood hazard.

Basic Soviet decisions regarding water resources development are made by the Presidium which, in turn, guide state plans. Among their policy aims are—

1. Development of heavy industry whatever the cost;
2. Regional self-sufficiency;
3. Industrial development responsive to strategic requirements; and
4. National self-sufficiency.

These policy considerations are designed in large part to further Communist aims in the world.

The Volga-Don-Baltic-White Sea waterway system is basically a means of lessening the strategic disadvantages of the landlocked position of European Russia. The canals will provide a means for the transfer of light naval vessels, especially submarines, between the several outlets to deep water. Commercial traffic on this system has been very disappointing despite official pressures for greater use. Soviet shippers still seem to prefer rail transportation.

There can be little doubt about the rapid industrial development of the U. S. S. R.

Senator Ellender, on January 28, gave a very interesting report on his observations of the Soviet efforts. Compared with the United States, the U. S. S. R. is investing a much larger percentage of its gross income in capital improvements of all sorts. In fact, in 1958 we are advised that capital-improvement investments in Russia are exceeding those in the United States.

However, this is accomplished only by planned restraint on production of consumer goods.

The Soviet technique has been described by the Director of the Central Intelligence Agency as forced-draft industrialization. What this means to the Russian people is pointed up by the fact that the consumer in Russia received only half of her total production in 1956, while in the United States the consumer received over two-thirds of the total.

The significance of this is all the more clear when it is realized that the gross national product in the U. S. S. R. was only about 40 percent of ours in that year.

Russian engineers and scientists are indeed performing high-grade technical work in many fields—water-resources development is no exception.

Yet we must look behind these obvious achievements to determine the real costs and values.

The autocratic government of the U. S. S. R. can and does arbitrarily withhold from its citizens the full fruits of their labor. The "planned economy" provides for primary emphasis on heavy industry and related services.

In effect, Russia is building material strength by excessive taxation of its working people. The average citizen has no choice in this. The Russian citizen has paid a tremendous price for little personal reward. Any prediction concerning future rates of expansion must be based upon the assumption that the individual Russian will continue to accept this excessive taxation and individual privation.

Such an assumption could well prove to be a fallacy, as the Hungarian uprising demonstrates.

Furthermore, the sixth 5-year plan was abandoned, and the new 7-year plan incorporates reductions in many of the Soviet goals.

Could not these reported goals for the future likewise prove to be excessive?

Perhaps of greatest pertinence to the United States is the question whether we are doing enough through our total efforts to strengthen our economic position in water resources, in view of our manifold responsibilities in the worldwide situation. Government effort in the United States is but a part of this total effort.

Under our system of economy it can only supplement and complement private efforts. However, it can and does provide a favorable environment in which private economic effort can thrive.

It would be a mistake to draw conclusions from Soviet and Red Chinese material accomplishments without a concurrent evaluation of the costs and benefits being derived.

We cannot, and should not, be placed in a position which demands that we abandon any of our traditional freedoms or compromise the basis of our economic system. To do so would be tantamount to defeat.

Our strength, indeed our past accomplishments, resulted from the energy and ingenuity of free men, working under a democratic form of government.

In the final analysis the benefits enjoyed by our citizens amply demonstrate that our efforts have been effective. With proper awareness of the elements of economic conflict in the current world situation, we are confident the American people and their Government will respond in every way necessary.

The hearings of this committee have assisted in assuring that our people have that awareness.

As the Director of the Central Intelligence Agency recently said:

> Certainly here we have the most serious challenge this country has ever faced in time of peace.

I thank you, Mr. Chairman.

Senator WATKINS. Thank you, Mr. Bennett.

I have no questions.

Since there are no other Senators present, you will get off easy.

Our next witness will be Mr. Francis Adams, Chief of the Bureau of Power, Federal Power Commission.

STATEMENT OF FRANCIS L. ADAMS, CHIEF, BUREAU OF POWER, FEDERAL POWER COMMISSION

Mr. ADAMS. Mr. Chairman, I appreciate the opportunity to come here and discuss the power picture in the United States.

I have a prepared statement which I believe is being circulated.

Senator WATKINS. You may go ahead and read it, or make a summary, whatever you wish.

Mr. ADAMS. It is relatively brief. I will read if that is satisfactory.

Senator WATKINS. That will be satisfactory.

Mr. ADAMS. Mr. Chairman, during the joint hearings held by these committees on February 17 and 18, several questions relating to the present and future power requirements and supply of the United States were raised by members of the commitees and by their staffs.

Since the Federal Power Commission maintains comprehensive information on this subject, I have prepared for your convenience this brief statement with the accompanying exhibits which I think you will find helpful in answering some of the questions which have been raised.

I will first discuss the present and estimated future total power supply, hydro and thermal, of the country, and, next, briefly describe the present status of development of our hydroelectric power resources.

These statistics and estimates of future power supply in the United States will then be compared with available information on Russia's power development program to show the relative magnitude of the total power supply of the two countries.

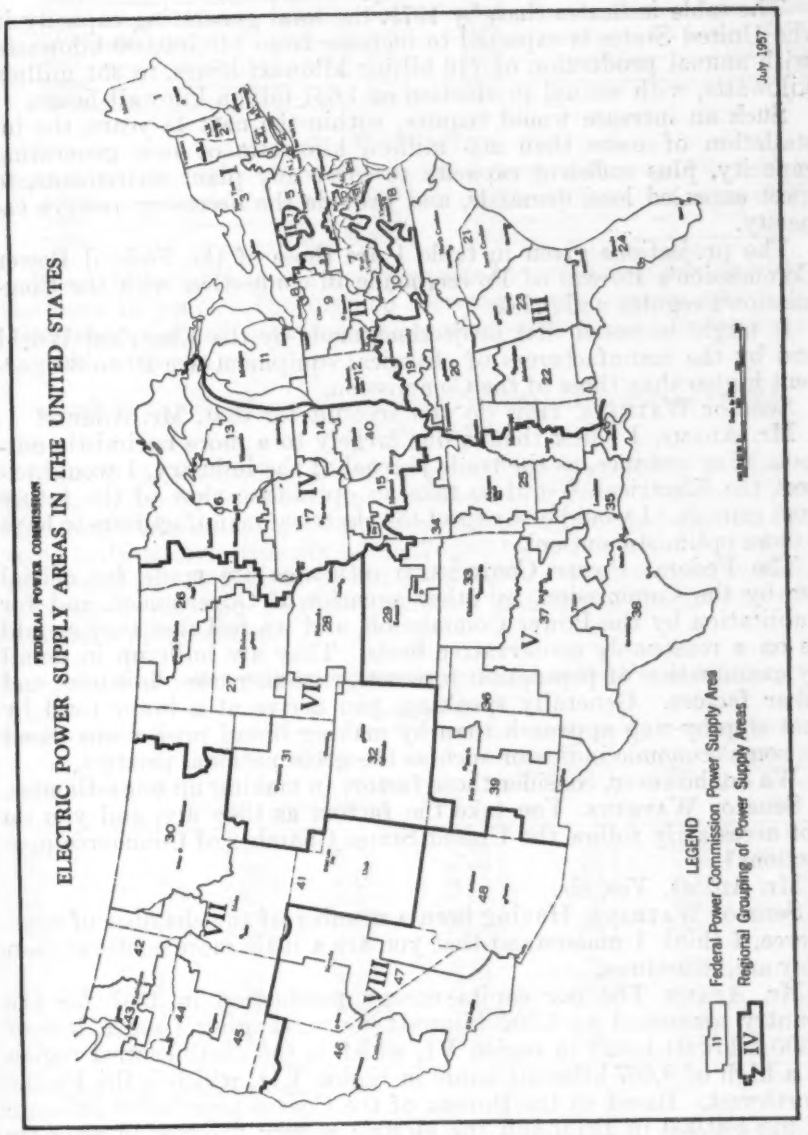
PRESENT AND FUTURE TOTAL POWER SUPPLY OF THE UNITED STATES

Table 1 shows the total electric-generating capacity, hydroelectric and thermal, and total production of electric energy in the United States by Federal Power Commission power supply regions in the year 1957, with projections at 5-year intervals to 1975.

TABLE 1.—*Electric generating capacity and production of electric energy of the United States, by regions with projection to 1975 (utility and industrial)*

FPC region	Installed capacity at end of year (millions of kilowatts)					Production (billions of kilowatt-hours)					Production, 1957 (kilowatt-hours per capita)
	1957	1960	1965	1970	1975	1957	1960	1965	1970	1975	
I	30.2	35.8	43.9	53.2	63.6	137.2	157.9	193.9	234.8	281.1	3,198
II	28.5	34.7	44.4	54.5	65.1	145.6	178.0	223.3	270.7	320.4	5,038
III	26.2	31.8	41.6	51.7	63.4	137.6	159.9	198.5	243.2	295.1	5,040
IV	17.1	21.6	28.1	35.0	42.5	80.0	102.5	134.1	167.0	202.7	3,463
V	16.5	22.3	30.0	37.4	45.7	85.2	104.2	134.2	164.5	195.2	4,019
VI	3.5	4.0	5.4	6.8	8.0	12.7	16.8	22.4	27.8	32.8	2,490
VII	10.5	14.7	18.6	23.3	28.4	57.2	76.3	97.1	120.7	146.7	8,667
VIII	13.2	15.1	21.0	27.1	34.3	60.2	72.3	97.0	125.2	157.1	3,960
Total	145.7	180.0	233.0	289.0	351.0	715.7	867.9	1,100.5	1,353.9	1,631.1	4,202

Regions:
I—Northeast
II—Ohio Valley—Great Lakes
III—Southeast
IV—North Central Great Lakes
V—Southwest
VI—Midwest—Great Plains
VII—Pacific Northwest
VIII—Pacific Southwest


FEDERAL POWER COMMISSION
ELECTRIC POWER SUPPLY AREAS IN THE UNITED STATES
July 1957
LEGEND
Federal Power Commission Power Supply Area
Regional Grouping of Power Supply Areas
I
II
III
IV
V
VI
VII
VIII

The figures in the table include utility plants, publicly and privately owned, and industrial plants.

The table also shows the production of electric energy per capita for each region and for the Nation in 1957. The extent of each of the regions is indicated on the accompanying map.

The table indicates that, by 1975, the total generating capacity in the United States is expected to increase from 145,700,000 kilowatts, with annual production of 716 billion kilowatt-hours, to 351 million kilowatts, with annual production of 1,631 billion kilowatt-hours.

Such an increase would require, within the next 18 years, the installation of more than 205 million kilowatts of new generating capacity, plus sufficient capacity to cover any plant retirements, to meet expected load demands, and provide the necessary reserve capacity.

The projections given in table 1 are those of the Federal Power Commission's Bureau of Power, made in connection with the Commission's regular activities.

It might be noted that projections made by the Electrical World and by the manufacturers of electrical equipment are 20 to 30 percent higher than those of the Commission.

Senator WATKINS. How do you account for that, Mr. Adams?

Mr. ADAMS. I think that is due largely to a more optimistic outlook. For instance, as the trade journal of the industry, I would expect the Electrical World to take an optimistic view of the future load growth. I would also expect the electrical manufacturers to have a more optimistic outlook.

The Federal Power Commission estimates are made for official use by the Commission, by other agencies of Government, and for publication by the Power Commission, and we feel that they should be on a reasonably conservative basis. They are built up in detail by examination of population forecasts, customer uses, unit uses, and other factors. Generally speaking, you arrive at a lower total by that step-by-step approach than by making broad projections based on some economic indicator such as the gross national product.

We do, however, consider those factors in making up our estimates.

Senator WATKINS. You take the factors as they are, and you do not necessarily follow the United States Chamber of Commerce projections?

Mr. ADAMS. Yes, sir.

Senator WATKINS. Having been a member of the chamber of commerce, I think I understand that you are a little more cautious than they are, sometimes.

Mr. ADAMS. The per capita energy production in 1957 for the country amounted to 4,202 kilowatt-hours, ranging from a low of 2,490 kilowatt-hours in region VI, which is the north-central region to a high of 8,667 kilowatt-hours in region VII, which is the Pacific Northwest. Based on the Bureau of the Census population estimate of 228,500,000 in 1975, and the electric energy production estimate stated above, the per capita production for the United States in that year will be 7,140 kilowatt-hours.

The average annual residential use of energy in the United States in kilowatt-hours per customer in selected years from 1930 to date, with projections to 1970, is shown in table 2.

TABLE 2.—*Average use of electric energy per residential customer in the United States*

Year:	Kilowatt-hours	Year—Continued	Kilowatt-hours
1930	547	1950	1,830
1935	677	1951	2,004
1940	952	1952	2,169
1945	1,229	1953	2,346
1946	1,329	1954	2,549
1947	1,438	1955	2,751
1948	1,563	1956	2,969
1949	1,684		

FORECAST

Year:	Kilowatt-hours	Year—Continued	Kilowatt-hours
1957	3,183	1960	4,024
1958	3,444	1965	5,709
1959	3,727	1970	7,901

It will be noted that such use is expected to more than double within the next 12 years. The marked increase in such usage reflects the expanding use of laborsaving, comfort-giving, and entertaining devices in the home.

PRESENT AND FUTURE HYDROELECTRIC POWER DEVELOPMENT IN THE UNITED STATES

Table 3 shows the hydroelectric generating capacity in the United States, by years, from 1945 to 1957, broken down as to Federal projects, non-Federal utility plants, and industrially owned plants. The total hydroelectric capacity of 27,676,000 kilowatts at the end of 1957 accounted for 19 percent of the 145,700,000 kilowatts total installed capacity in all types of plants, thermal and hydro, operated by both utilities and industries.

TABLE 3.—*Hydroelectric generating capacity in the United States*

[In megawatts [1]]

Year	Utilities			Industrial	Total	Annual increase (+) or decrease (−)
	Federal	Non-Federal	Total			
1945	4,621	10,291	14,912	980	15,892	
1946	4,488	10,360	14,848	979	15,827	−65
1947	4,596	10,375	14,971	985	15,956	+129
1948	5,095	10,557	15,652	983	16,635	+679
1949	5,784	10,870	16,654	1,008	17,662	+1,027
1950	6,448	11,227	17,675	999	18,674	+1,012
1951	7,401	11,467	18,868	1,002	19,870	+1,196
1952	8,257	12,162	20,419	996	21,415	+1,545
1953	9,311	12,734	22,045	1,009	23,054	+1,639
1954	10,191	13,020	23,211	1,027	24,238	+1,184
1955	11,300	13,704	25,004	738	25,742	+1,504
1956	12,135	13,519	25,654	732	26,386	+644
1957	13,018	13,933	26,951	725	27,676	+1,290

[1] 1 megawatt equals 1,000 kilowatts.

Senator WATKINS. When you speak of industries, you are talking of private industry?

Mr. ADAMS. I am talking of industrial operations such as refineries, or aluminum plants, and so on, that have their own power installations; that is industrially owned plants as distinguished from the electric power industry itself.

Senator WATKINS. It would be privately owned?

Mr. ADAMS. Yes, sir.

Senator WATKINS. The United States has been in so many businesses we sometimes get the idea that the United States is also an industrial operator.

Mr. ADAMS. Yes, sir.

Senator WATKINS. I wanted to be sure of the distinction you were drawing.

Mr. ADAMS. These are all privately owned industrial plants.

The latest Federal Power Commission estimates, as of January 1, 1957, place the total undeveloped hydroelectric power in the United States at about 90 million kilowatts capacity, with average annual generation of approximately 367 billion kilowatt-hours. This estimate includes projects concerning which only limited data are available. Some 56 percent of the Nation's undeveloped power is in the area west of the Continental Divide, and 35 percent is in the Columbia River Basin.

Combining the undeveloped with the total developed hydroelectric capacity indicates a total potential hydro capacity in the United States of more than 117 million kilowatts, with average annual production of some 500 billion kilowatt-hours.

Thus, approximately 23 percent of the potential hydro of the country has been developed to date.

As of January 1, 1958, nearly 30 million kilowatts of potential hydro capacity was either under construction or in various stages of planning and authorization, as summarized in the following:

1. Under construction by Federal agencies as parts of multiple-purpose river-development programs, 5,800,000 kilowatts.

2. Under construction by non-Federal interests under Federal Power Commission licenses, 5,300,000 kilowatts.

3. Under Federal Power Commission licenses, but not under construction, including additional units at existing projects, 3,800,000 kilowatts.

4. Included in applications for licenses or amendments pending before the Commission, 5 million kilowatts.

5. Included in preliminary permits outstanding or in applications for preliminary permits pending before Commission, 4,200,000 kilowatts.

6. Authorized for construction by Federal agencies, but not under construction, including additional units at existing projects, 5,600,000 kilowatts.

These amounts total 29,800,000 kilowatts.

Completion of the installations listed above would more than double the hydroelectric capacity in the United States.

The period within which this may be accomplished cannot be determined with accuracy, but it appears likely that most of this potential capacity will be constructed within the next 20 years, possibly by 1975.

At that time the developed hydro capacity would amount to 57,500,000 kilowatts, or nearly 50 percent of the total potential hydro of some 117 million kilowatts capacity, including both developed and undeveloped.

This may be compared with the 23 percent noted above as the part of our total potential hydro that is now developed.

Senator WATKINS. May I ask this question: Are we developing our hydro possibilities as rapidly as the power is needed?

Mr. ADAMS. Yes, sir; that is true, each hydro project is essentially a tailormade job to meet a certain need for power in a particular area.

In cases where we are developing multipurpose projects under Federal plans, of course, some other needs such as flood control and navigation may be the primary motive.

But, generally speaking, a hydro project is designed to meet a certain expected need of the power demands in the area, sir.

Senator WATKINS. Is it also true that in nearly all of the hydro development areas we also have thermal plants as well to help us sustain the load.

Mr. ADAMS. That is true in all areas of the country. Only in the Northwest is the supply almost wholly waterpower, although there are some thermal plants in the Northwest region.

In time, as the Columbia River resources are developed, more steam capacity will be required and is being planned for that area.

Senator WATKINS. How about in the Tennessee Valley area?

Mr. ADAMS. In the Tennessee Valley area, which was originally a predominantly hydro area, steam capacity is now the predominant supply.

Senator WATKINS. You say steam is now the predominant supply?

Mr. ADAMS. Yes, sir. The total supply in the TVA area today is about 10 million kilowatts, either operating or in the planned or construction stage, of which about 3 million is hydro and the rest is steam.

About 70 percent of the TVA supply is steam.

Senator WATKINS. Outside of the TVA area, has the Federal Government built thermal plants?

Mr. ADAMS. No, sir; except in certain defense installations, where I believe we have an occasional plant.

Senator WATKINS. Thermal plants in the other areas of the United States have been built and operated by private industry?

Mr. ADAMS. By private and publicly owned systems. None by federally owned systems.

COMPARISON OF THE UNITED STATES AND RUSSIAN POWER DEVELOPMENT

Available information indicates that the total installed generating capacity in Russia at the end of 1956 amounted to 42,785,000 kilowatts, including 34,425,000 kilowatts of thermal capacity, and 8,370,000 kilowatts of hydro capacity.

Generation in 1956 amounted to about 192 billion kilowatt-hours, of which 163 billion kilowatt-hours was generated in thermal plants and 29 billion in hydro plants.

With a population of around 200 million, the capacity per capita in Russia amounted to 0.214 kilowatts and the annual energy production per capital amounted to 959 kilowatt-hours.

These figures may be compared with the following for the United States, with a 1956 population of 168 million:

Capacity per capita, 0.816 kilowatts.

Annual energy production per capita, 4,069 kilowatt-hours.

The United States energy production per capita is over four times the Russian per capita energy production.

22325—58——12

Senator WATKINS. For the kilowatt-hours?

Mr. ADAMS. The kilowatt-hours are over four times and the kilowatts a little less than four times.

Senator WATKINS. That is per capita?

Mr. ADAMS. Per capita; yes, sir.

The total estimated potential hydroelectric power in Russia has been reported as 340 million kilowatts of capacity with annual production of some 2,978 billion kilowatt-hours, which is 3 to 5 times the estimated hydro potential of the United States.

On the basis of these figures, it appears that about 2½ percent of the total Russian potential has been developed as compared with 23 percent development in the United States.

The following tabulation compares the total installed electric generating capacity in the United States and Russia at 5-year intervals. Details by years are shown in table 4.

TABLE 4.—*Total capacity of electric generating plants and production of electric energy in the United States and Russia (including industrial)*

Year	United States [1]		U. S. S. R.[2]	
	Capacity megawatts	Production, million kilowatt-hours	Capacity megawatts	Production, million kilowatt-hours
1902	2,987	5,969		1,900
1907	6,809	14,121		
1912	10,980	24,752		
1917	15,494	43,429		
1920		56,559		
1921		53,125		
1922	20,468	61,204		
1923		71,399		
1924		75,892		
1925		84,666		
1926		94,222		
1927	34,574	101,390		
1928		108,069	1,874	5,000
1929		116,747		6,200
1930		114,637		8,400
1931		109,373		10,700
1932	42,849	99,359	4,630	13,500
1933		102,655		16,400
1934		110,404		21,000
1935		118,935	6,830	26,300
1936	43,582	136,006		32,800
1937	44,370	146,476		36,200
1938	46,873	141,955	8,700	39,400
1939	49,438	161,308		43,200
1940	50,962	179,907	11,000	48,300
1941	53,995	208,306		
1942	57,237	233,146		
1943	60,539	267,540		
1944	62,066	279,525		
1945	62,868	271,255	10,700	43,300
1946	63,066	269,609		48,600
1947	65,151	307,400		56,500
1948	69,615	336,809	18,000	66,300
1949	76,570	345,066	20,000	78,300
1950	82,850	388,674	22,400	91,200
1951	90,127	433,358	23,500	104,000
1952	97,312	463,055	25,250	119,100
1953	107,354	514,169	28,602	134,400
1954	118,885	544,645	32,812	150,600
1955	130,414	624,902	37,231	170,100
1956	137,342	683,894	42,795	192,000
1957	145,089	715,705		

[1] From historical statistics of the United States for years 1902–38. Data for later years are from Federal Power Commission statistics.

[2] Capacity is from the United Nations, Economic Commission for Europe, Electrical World and Electrical Engineering. Production is from "The National Economy of the U. S. S. R., a statistical compilation, Moscow, 1956."

It will be noted that the United States superiority has more than doubled since 1940, having increased from 39,962,000 kilowatts in 1940, to 94,547,000 kilowatts in 1956:

	Kilowatts		
	United States	U. S. S. R.	United States superiority
1940	50, 962, 000	11, 000, 000	39, 962, 000
1945	62, 868, 000	10, 700, 000	52, 168, 000
1950	82, 850, 000	22. 400, 000	60, 450, 000
1956	137, 342, 000	42, 795, 000	94, 547, 000

As can be seen from the table, over that 16-year period, our superiority in terms of kilowatts in excess of those available in Russia has increased from about 40 million to 94 million.

The following tabulation shows the average annual growth of installed electric generating capacity in the United States and Russia from 1940 to 1956. In the last 6 years, the United States has been adding capacity at an average rate nearly 3 times that of Russia.

	Average annual growth in kilowatts			
	United States		U. S. S. R.	
	Growth in period	Per year	Growth in period	Per year
1940–45	11, 906, 000	2, 380, 000		
1945–50	19, 982, 000	3, 996, 000	11, 700, 000	2, 340, 000
1950–56	54, 492, 000	9, 082, 000	20, 395, 000	3, 399, 000

NOTE.—Maximum year (United States), 11,529,000; maximum year (U. S. S. R.), 5,564,000.

You will note, for instance, our rate has been 9,082,000 kilowatts per year during that 6-year period, whereas Russia's has been 3,399,000 kilowatts.

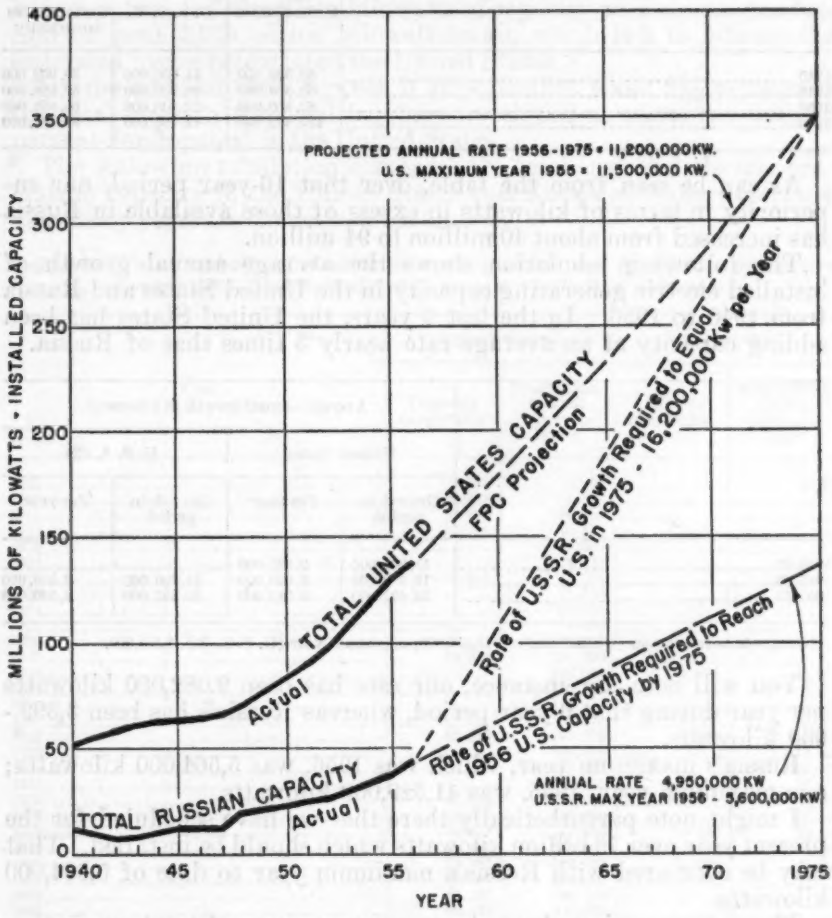
Russia's maximum year, which was 1956, was 5,564,000 kilowatts; our maximum year, 1955, was 11,529,000 kilowatts.

I might note parenthetically there that we have scheduled for the present year over 16 billion kilowatts which should be installed. That may be compared with Russia's maximum year to date of 5,564,000 kilowatts.

The accompanying chart shows a comparison of total generating capacities in the United States and Russia for the years 1940 to 1956, with projections to 1975. It shows graphically how the United States has been outdistancing Russia in the installation of electric generating capacity.

COMPARISON OF TOTAL GENERATING CAPACITIES
IN THE
UNITED STATES AND RUSSIA

UTILITY AND INDUSTRIAL PLANTS
HYDRO AND THERMAL CAPACITY



As shown in the lower curve, if Russia is to catch up with the United States by 1975, it must install new capacity at the unprecedented rate of 16,200,000 kilowatts annually, or at a rate more than 4 times their actual rate—3,399,000 kilowatts—during the 6-year period 1950–56, and nearly 3 times their maximum annual rate of installation (5,564,000 kilowatts) during that period.

Senator WATKINS. Before you leave that phase of it, I would like to go back to page 5 of your statement. I note that you report as follows:

Available information indicates that the total installed generating capacity in Russia at the end of 1956 amounted to 42,795,000 kilowatts, including 34,425,000 kilowatts of thermal capacity and 8,370,000 kilowatts of hydro capacity.

How do you account for that in a nation that has so much greater potentiality in the hydro field?

Mr. ADAMS. I do not know the reason why they have only recently started extensive hydroelectric development programs, but it appears from information given by General Itschner in his testimony that they have planned now, either existing, under construction, or planned, something on the order of 25 million kilowatts of hydro.

So they are now moving to an emphasis on hydroelectric development. Just how fast that 25 million kilowatts of capacity may come in, I don't know, but it appears that it might take a 10-year period for full development of the tremendous projects described in that testimony.

I would expect for the future, for some years yet, the emphasis in Russia will be on water power.

Senator WATKINS. They certainly have been rather slow in that development until very recently.

Mr. ADAMS. Yes, sir; that is correct. I think these figures would indicate that.

Senator WATKINS. Does this conclude your paper?

Mr. ADAMS. Yes.

Senator WATKINS. I would like to inquire into another field.

Now, with respect to generating electric energy by use of atomic power, can you give any indication of the possibilities in that field?

Mr. ADAMS. I hve not attempted to identify nuclear capacity in the projection on the chart. The chart, of course, includes all sources of supply, hydro and thermal.

However, our projections would indicate, if you break them down by types of generating capacity, that by 1975, where we show 351 million kilowatts, we would roughly indicate that about 15 percent of that will be water power and 85 percent thermal power.

Just how much of the thermal will be nuclear power by that time, we do not know, but various estimates have been made which would indicate that possibly it may be as high as 10 percent.

There are many different views of just how fast we will be able to develop nuclear power.

Senator WATKINS. That will depend on its cost, will it not?

Mr. ADAMS. It will depend largely on its cost, and the development of the art of design of nuclear reactors and their ability to compete economically with other thermal sources.

Senator WATKINS. Several plants that have been installed up to the present time do not show a favorable ratio of costs with either hydro or thermal power.

Mr. ADAMS. That is correct.

The large plant operating now at Shippingport, near Pittsburgh, is frankly admitted to be a high-cost plant. It is a research and development project. The costs there are estimated to be on the order of 55 to 60 mills, which is roughly 10 times what it costs to generate power at a comparable annual load factor in that particular area from conventional plants.

Other plants, however, are in the design stage in other locations which have estimates of cost considerably below Shippingport, say on the order of 8- or 10-mill power. How fast can we get down to that point on a large scale remains to be seen.

I would expect that 10 to 15 years will be required before we will be able to compete on a considerable scale with conventional types of thermal plants.

Senator WATKINS. Of course, an atomic powerplant would probably be well worthwhile because that plant can be taken anywhere, whereas you cannot get the hydro power everywhere.

Mr. ADAMS. That is true. Thermal plants of any kind, conventional types, of course, have to be located with reasonable regard to the availability of the fuel supply, as well as nearness to the market.

A nuclear plant can be readily located where needed, except, of course, water supply is an important consideration.

Senator WATKINS. This is one comparison I think might be made between power production in the United States and in Soviet Russia, and that is that apparently in Soviet Russia they do not have to consider the cost factor of what can be produced out of the power development.

Mr. ADAMS. I think that is generally true.

However, I am sure they must give consideration to the cost factor, but to what extent they go into the rather rigid economic comparisons that we do, I don't know. I doubt very much that they do.

Senator WATKINS. Private industry will not build a plant here unless it is productive and can be operated at a profit.

Mr. ADAMS. That is true. The Russian plants are being built wholly by Government and can be built under whatever conditions the Government itself chooses to use, or what criteria they wish to follow and observe in determining the feasibility of the project.

Senator WATKINS. I might also add that in Federal and other public power generation in this country, the cost factor is always a very heavy consideration, I mean the cost factor plays an important part in whether or not the plant will be built.

Mr. ADAMS. Yes, sir.

Senator WATKINS. The Federal projects all have to be profitable, in other words; they have to sell power and make a profit on them.

Mr. ADAMS. That is quite true.

Senator WATKINS. And repay the cost.

Mr. ADAMS. Yes, sir.

It is our policy to apply the same economic principles to determine the feasibility of a Federal project as we do for a private project; that is, it must meet the test of the cost of the most likely alternative source of supply before we will consider the hydro project to be feasible.

Senator WATKINS. Do you have any information on the Russian development of atomic power used for generating electricity?

Mr. ADAMS. No, sir; I have no details on that, although the Russians reported at the World Power Conference in Belgrade last year that they have five large-scale reactors in the planning and construction stage.

I think 2 of them are under construction and 3 are still in the planning stage. They did not give the capacities of all of them—they indicated they were large-scale plants on the order of 100,000 kilowatts.

They have not reached the stage of any significant addition to their power supply from that source.

Senator WATKINS. Anywhere in the world, as a matter of fact, anywhere you have hydro power, atomic power is not competitive with hydro or thermal power at the present time.

Mr. ADAMS. That is correct. We have no area where nuclear plants are yet truly competitive with hydro power or conventional steam plants.

Senator WATKINS. I was rather surprised in your statement about the power costs at Shippingport. I was advised sometime earlier that the cost is running well over 100 mills.

Mr. ADAMS. I think that may be a figure that possibly includes a different concept of how much of the fuel costs are included in the cost. The fuel costs can affect greatly the total costs, depending on what charge the Federal Government makes for the use of the fuel. The fuel is in effect leased to the used—they do not own the fuel. Then a charge is made to them for the fuel that is used in the plant.

Senator WATKINS. Do you know what the lease terms are based on?

Mr. ADAMS. No, sir; I do not. The Atomic Energy Commission, of course, has well-defined procedures that have been publicized as to how that charge is determined.

Senator WATKINS. Thank you, Mr. Adams.

Mr. ADAMS. Thank you, sir.

Senator WATKINS. The next witness is Mr. Phillips.

STATEMENT OF GEORGE R. PHILLIPS, CHIEF, RIVER BASINS BRANCH, SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

Mr. PHILLIPS. Mr. Chairman, the Secretary of Agriculture, in his letter of February 12, 1958, to the chairman of the Senate Committees on Interior and Insular Affairs and on Public Works, pointed out that the program of the Department of Agriculture having to do with river and related water and land resource development are its nationwide programs for soil and water conservation, administration of the national forests, and cooperative forestry.

Under the soil and water conservation program several broad types of assistance are provided:

Technical assistance is made available through soil conservation districts to assist individual farm and ranch owners and operators in planning and installing conservation measures on their properties.

Local organizations are furnished assistance in planning and installing watershed improvements for flood prevention or the conservation, development, utilization, and disposal of water in small watersheds.

The cost of installing certain of these measures and improvements is shared by the department.

The national forests provide protection to the upper watershed areas of many of the Nation's important rivers. Cooperative assistance is furnished the States in the protection of non-Federal forest lands from fire and forest pests, in the production and distribution of forest planting stock and in the provision of forest management assistance to private landowners.

These various programs are carried forward on a countrywide basis in relation to the needs of our Nation and the ability of in-

dividual and groups of people, local organizations, and the States to proceed with their share of the activities involved.

Senator WATKINS. You mean share of the cost?

Mr. PHILLIPS. Share of the cost.

Senator WATKINS. What is that share?

Mr. PHILLIPS. It varies with the programs. It is a wide variation from a very high percent to a relatively small one. I don't think it has ever been averaged, Senator, for all the programs.

Water and soil are interrelated. Water conservation inevitably is tied to soil conservation in the broader concept of these resources. Water conservation likewise is part and parcel of any consideration of water supply, management, or its requirements by agricultural and nonagricultural users.

All of our water comes to us, of course, as precipitation. For practical purposes, it all falls on the land, as less than 2 percent of the country's total area is in lakes and streams. This water either soaks into the soil, some of it percolating through to ground water level, or runs off immediately into streams and lakes or man-built reservoirs, except for that which evaporates.

How much of the water supply is available for crops and livestock, municipal, and industrial purposes, wildlife, recreational, or other use, depends upon our ability to intercept this precipitated water as it moves endlessly to the ocean in surface streams or through the soil and underground.

It is the amount of available, usable water that counts, and that depends upon the in-soak and runoff of each watershed.

Although the earth's overall water supply is relatively constant and is more than ample, we are increasingly plagued by seasonal and geographic unevenness in its distribution in the face of constantly increasing demands for water.

Most of us have to live with the water we have in our own watershed or river basin. There are some exceptions due to transriver diversions.

In other words, our water problems are, first of all, local problems, tied to the lands that comprise our fields and pastures and forests, watershed by watershed, State by State, river basin by river basin. Together, they make up our increasingly pressing national water problems.

Our growing soil and water conservation technology: With our growing population and increasing per capita use of water, we have to think in terms of maximum use of all the water we have, some of it not once, but many times over, and our watershed plans, and broader river basin plans, as well, need to be developed on that concept.

We are using more and more water all the time, 21 percent more in 1955, for example, than we used in the United States in 1950.

Four times as much in 1950 as in 1900, while our population was doubling.

Our high level of industrial development has contributed substantially to this rapid increase in use of water.

Our national water needs are expected to double again by 1975, while population increases 40 percent. Developments to supply the required water may be expected as the needs become evident.

We, fortunately, have developed a sound and practicable soil and water conservation technology. It is a technology that has grown

during the last 25 to 30 years, and is still growing, particularly water conservation techniques under impetus of the more recently expanding small watershed movement.

The techniques of water conservation, management, and use as related to farm, forest, and other watershed lands are of more than ordinary significance.

This conservation technological advancement has given us hope and tangible assurance of being able to cope with those parts of multiple water resource problems in our field of responsibility as public understanding of those problems progresses, and as public and private determinations are made to do something about them as needs become apparent.

It is not enough to have developed our technology as has been done by the Soil Conservation Service as the agency responsible for technical leadership in the Department of Agriculture's soil and water conservation and flood prevention activities, experiment stations, and agricultural colleges.

The real measure of its worth has been the way in which soil conservation districts and other farmers and ranchers, and a growing number of communities throughout the country, have applied these conservation measures successfully and with profit on farm and other watershed lands.

Basic soil and water conservation principles: In regular soil conservation district operations, in small watershed projects, through the Great Plains conservation program, or otherwise, definite basic principles govern technical assistance provided through these undertakings as part of the department's national action program of soil and water conservation.

It is especially pertinent to review them briefly in consideration of why water conservation must start on the land:

By soil and water conservation today, we mean proper land use, protecting land against all forms of soil deterioration, rebuilding eroded and depleted soil, improving grasslands, woodlands, and wildlife lands, conserving water for agricultural and other uses; proper irrigation, drainage and flood prevention; building up soil fertility, and making efficient and profitable use of these resources.

The use and treatment of each acre of land within its capabilities and according to its need continues to be the starting point of modern soil and water conservation technology.

This simply means using all of our land for the kind of production for which it is best suited. It means applying to the land those cropping, tillage, structural, water management, or other conservation measures that will assure continued production efficiency from the land.

Cropping, tillage, or other conservation measures to be applied or structures to be installed are determined by soil surveys and basic conservation plans.

The detailed acre by acre soil surveys develop basic information on soil type and condition, slope, erodibility, and other factors, thus showing the land's capabilities for cropping, pasture, woodland, or wildlife use.

The conservation farm plan, based on the soil survey, is a field by field, practice by practice blueprint for the treatment and use of the

land. It calls for the most effective combination of practices needed to do the job.

The objective of conservation planning is a sound soil and water conservation program coordinating the physical, economic, and human resources of farm, ranch, or watershed.

In short, soil and water conservation, as we know and practice it today, in an across-the-board operation, resourcewise, involving the entire range of interrelationships of soil, water, plants, animal life, and people.

For example, the owners of the land on which rain and snow falls have the first opportunity to use that water on those lands to maintain them in stable and productive condition, and to support the farming or ranching economy for which the land is suited.

This implies, of course, responsibility also on the part of the landowners in their own and the community's and public interest.

Growing experience confirms that what is good practice for flood prevention and general community and public interest, also is good for those who own and operate the land; that is, from the standpoint of more efficient and stable operations making for the production of what we need, in the amounts needed, when we need it.

Today's broadened conservation concept takes in all the resources of the community, the State and the Nation. It involves small watersheds and entire river basins, as well as the individual farms and ranches or other properties in them.

Perhaps most significant of recent broadened resource conservation authorizations for meeting public need and demands is the Watershed Protection and Flood Prevention Act—Public Law 566 of the 83d Congress, as amended.

Watershed protection and flood prevention: Efficient water utilization is the key to resource conservation anywhere, and the small watershed with which this act is concerned is a key unit in our soil and water conservation efforts.

The Watershed Act, for the first time, has given truly national recognition to the important place of upstream watershed improvements in our flood prevention efforts and in water conservation, development, utilization, and disposal.

Congress made it clear that the additional authority under the Watershed Act should be used to complement both existing and agricultural soil and water conservation programs and needed programs for development and flood protection of major river valleys.

Thus the act essentially provides a basis for coordinating locally undertaken upstream watershed improvements with water resource development projects on major rivers.

Because much of our water supply sooner or later crosses farm or ranch lands, though a great deal of it falls first on forest lands, water conservation and management is principally an agricultural problem, and watershed protection, accordingly, is basically an agricultural undertaking of community wide concern. It properly takes into full account the multiple use of our water supply, and depends upon the teamwork of all affected interests.

Land treatment goes with or, actually, precedes other watershed-protection measures. Even where supplemental flood prevention of water-management structures are required, agronomic, woodland, and

other measures on the watershed above them are of first importance in guaranteeing the efficiency and long life of the structures.

The Watershed Act requires that at least 50 percent of the land above any retention reservoir be planned for conservation land treatment. This provides a further incentive for landowners to speed up their rate of application of conservation cropping, tillage, and other land-treatment practices.

Local, State, Federal teamwork is essential. The principles embodied in the watershed authorization extend the basic concept of the soil-conservation districts organized and managed by farmers and ranchers under State or Territorial enabling laws in the 48 States and 4 Territories. That is the concept of local initiative and responsibility; teamwork between local, State, and Federal agencies, and Federal, technical, and financial help provided only when local people justify and request it.

The president summed it up this way when he signed Public Law 566:

> This act recognizes by law for the first time the great importance of upstream watershed protection in an overall water-resource policy. For the first time, also, this act provides a broad program of Federal, technical, and financial assistance to such local watershed groups as are willing to assume responsibility for initiating, carrying out, and sharing the costs of watershed protection which will help conserve water for agricultural use and supplement any needed downstream flood-control measures.

Watershed projects are not Federal projects—the Federal Government does not construct them. A project application must be made by a local organization that has authority under State law to carry out, maintain, and operate the works of improvement provided for in the act. This, usually, is a soil-conservation district, but may include other organizations, such as watershed, irrigation, or conservancy districts, or a municipality, to carry out a joint program.

Federal financing is provided for 100 percent of the flood-prevention structural part of a watershed project, over and above locally provided land, easements, and rights-of-way, water rights and land treatment, and Federal cost sharing is provided for irrigation, drainage, and other agricultural water management.

But the entire construction costs and engineering services must be borne locally for the municipal or industrial water-supply part of a project, though Federal loans or advancements may be made to assist local organizations in meeting their share of the costs.

Senator WATKINS. Is any interest charged on money that goes into loans?

Mr. PHILLIPS. Yes, sir. The State's role in operations through the Watershed Act, likewise, is an essential one. Thus, as a condition to the provision of Federal assistance, State water laws and individual water rights must be fully honored, and initial approval of proposed watershed projects is required by the designated State agency.

Thirty-eight States so far have enacted 80 pieces of legislation to enable local groups to make better use of the Federal aid available in watershed protection.

Soil and water conservation in river-basin development: The Department of Agriculture has an interest in the broader river-basin aspects of water-resource development, outside the scope of the small watersheds, as such. Developments on the main streams have im-

pacts upon the use and management of their watersheds. It is going to continue to be important in all our river-basin development efforts—involving, sometimes, complex interrelationships of watershed lands, flood plains, and stream channels—to have careful planning and coordination of works of improvement and the fullest Federal and State cooperation.

Representatives of agricultural interests must participate in the comprehensive planning and development of water resources in river basins all along the line.

The Department recognizes its responsibilities and opportunities for working with the agencies represented on the Interagency Committee on Water Resources and in the Interagency River Basin Committees in Missouri, Arkansas-White-Red, Columbia, Pacific Southwest, and northeastern areas, as well as with all responsible local, State, and regional interests.

Working with these committees enables us to help coordinate the soil and water conservation and related agricultural activities in which the Department has assigned responsibilities, and other developments for which other agencies have primary responsibility.

The Department of Agriculture is participating in several surveys under the provisions of section 6 of the Watershed Protection and Flood Prevention Act. That section authorizes the Department of Agriculture to cooperate with other Federal, State, and local agencies in investigations and surveys of the watersheds of rivers and other waterways as a basis for the development of coordinated programs.

The Soil Conservation Service has general responsibility for such activities, with the Forest Service and Agricultural Research Service participating, respectively, on the forestry and economic aspects.

As an example of such surveys, at the request of the Corps of Engineers, the Department of Agriculture is cooperating in a review of the corps' lower Mississippi River and tributaries project. This participation makes possible the consideration of the probable effects, upon agricultural development and upon the use of Mississippi River Delta lands, of flood control and major drainage improvements proposed by the corps.

Also, at the request of the Corps of Engineers, the Department of Agriculture is cooperating in a review of the corps' reports on the water resources of the Delaware River Basin.

Information is being developed on existing and probable agricultural and other rural needs for water, upon opportunities for water development and use, and upon the place of watershed improvements in the development of the water resources of the basin.

Participation in a similar survey of the Potomac River Basin is just getting underway.

By direction of the President, the Department of Agriculture is cooperating with the Department of the Interior in a reappraisal of the direct agricultural benefits to be expected from development of the participating projects of the Colorado River storage project.

A USDA field party of technicians, with assistance, as needed, from the regular field organizations of concerned Department of Agriculture services and the agricultural colleges of the concerned States, is engaged in the necessary fieldwork and is preparing reports on the various projects.

The fieldwork and report preparation are being carried on in cooperation with field representatives of the Bureau of Reclamation in accordance with mutually agreed-on schedules. The impact of project facilities on lands and improvements administered by the Department of Agriculture and the relationships between project facilities and watersheds are also being considered.

Other such surveys of the watersheds of river-basin areas also are underway in cooperation with Federal and State agencies.

Moving ahead with water conservation on land-use basis: Various departmental agencies have contributed to progress in the water-resource field charted to date. The Agricultural Research Service has focused increasing resources on the problems of soil, water, and vegetation.

The cost-sharing aid extended through the agricultural conservation program, the conservation reserve, and the credit programs adapted to conservation by the Farmers' Home Administration have played an important part.

The Forest Service and Federal Extension Service have aided and encouraged the State forestry and extension services to bring effective conservation help to farmers and ranchers. The Soil Conservation Service has provided technical assistance.

The groundwork has been well laid in the past 20 to 25 years for effectively moving ahead with water conservation in proper relation to agricultural and other land use.

We have such efficient conservation tools to work with as the programs of the more than 2,775 soil-conservation districts, that now include almost 90 percent of the country's farmland, and the small watershed projects authorization.

The Great Plains conservation program now getting underway is another tool of special importance and major promise in the Great Plains area.

Water-conservation device, such as ponds and terraces, are an important feature of this regional conservation undertaking.

These are, also, of the agricultural conservation program and of the newer cost-sharing conservation reserve program.

Soil Conservation Service records show that, as of December 31, 1957, technical assistance had been furnished by that agency through soil-conservation districts in the planning and construction of various measures and practices for water conservation and use. Included were over 885,000 farm ponds, nearly 22,000 small irrigation reservoirs, and over 45,000 farm sprinkler irrigation systems.

Technical assistance also was furnished in planning and applying improved irrigation water application and management practices on over 12,775,000 acres of irrigated farmland and improved drainage on over 20 million acres of farmland.

As of May 1, a total of 852 applications for Public 566 watershed planning and construction assistance had been received in Washington from local groups.

Of those, 351 in 46 States and Hawaii had been authorized for planning assistance, of which 83 in 36 States had been authorized for actual operations.

Also, a report on March 21 on the new Great Plains conservation program showed that since December 1957 about 1,565 farmers and

ranchers either had signed contracts or filed applications for participation.

Incidentally, each of these participants, and those to follow, pledge themselves to put into effect complete conservation farm or ranch plans—one of the most important features of the entire program.

The soundness of upstream watershed protection and flood prevention—water conservation beginning on the land—is becoming increasingly evident. Its effectiveness has been demonstrated repeatedly.

It has proved itself in the soil conservation districts, in those subwatersheds which so far have been treated in the 11 flood prevention projects authorized by the Flood Control Act of 1944, and in various ones of the 55 pilot small watershed projects on which conservation land treatment and needed structures have been finished or are nearing completion.

We have seen the results when heavy rains occurred, in measurable dollars and cents benefits, in the watersheds of the Little Sioux in Iowa, the Washita in Oklahoma, the Trinity in Texas, and elsewhere over the country.

How such watershed flood prevention measures performed in reducing flooding, silting, and other damages during the spectacular rainstorms in Texas and Oklahoma in the spring of 1957 is a fascinating story of itself.

Report after report came in of little or no such damage on the treated creek watershed in the Trinity and the Washita watersheds, with major flooding and other damage occurring on adjacent and virtually indentical untreated drainages.

As an example, Soil Conservation Service estimates were that the 135 completed floodwater retarding structures that functioned in the Trinity prevented $1,080,000 in damages to crops, pastures, livestock, homes and buildings, roads and bridges, and utilities.

They also trapped and held back about 5,000 acre-feet of sediment.

These savings were to flood plain lands in the tributaries alone, and included no benefits claimed in the main stem bottom lands.

Comparable flood-damage prevention was reported from the Washita watershed, where work on Sandstone Creek and other tributaries repeatedly has proved its effectiveness in recent years.

Summing up, our flood prevention people figured that if complete watershed treatment of all applicable watersheds had been in effect during those storms in the affected Oklahoma, Texas, and Arkansas area, damages would have been reduced by about 70 percent. That would have provided benefits of approximately $109,320,000. That would represent a most substantial and worthwhile saving.

We still have a tremendously big job to do in farm and watershed conservation, and in helping to prevent floods and alleviate drought.

Competition is increasing year by year for our water supply, for agricultural, municipal and industrial, recreational and other uses. So is competition for our likewise limited supply of available good, productive land, as cities, industry, highways, and other nonagricultural users continue to take over more than a million acres of cultivable land each year.

Although a very substantial part of the basic soil and water conservation work, particularly in water resource conservation, remains to be completed. We shall know more precisely how big the job ahead really is when the information has been gathered and compiled

in a national conservation needs inventory which is now underway by the Department of Agriculture in cooperation with State and other interests.

Our experience as a nation demonstrates that as needs for the development of water resources have occurred, programs to meet those needs have been successfully provided. Today there is widespread public recognition of and support for programs of conservation to protect and enhance the productive capacity of our renewable natural resources.

There is growing recognition of the communities of interests existing between the management and use of lands and the availability of needed supplies of clean usable water. There is a growing body of technical and economic information provided by research and basic data collection agencies.

This fund of knowledge already is substantial. There is recognition of need for its enlargement.

In our kind of society maximum progress in any area of endeavor is achieved when there is the maximum degree of public understanding of and support for the purposes of the undertaking.

There is a high and growing degree of public understanding and support for conservation and for development of our water resources. This understanding and support is widely distributed among all levels of government, private groups and organizations, and the general public.

Maximum development of water resources occurs when public programs provide recognition of and participation for this widely dispersed support.

We have every confidence of the Nation's ability to meet our needs for resources development, including water resource development, within the framework of our democratic institution and in accord with the principles of representative government.

Senator WATKINS. Can you give us an idea of the capacity of these 22,000 smaller irrigation reservoirs?

Mr. PHILLIPS. We don't have information on those combined, but they are relatively small, usually for use on an individual farm.

Sometimes they serve a small group of 3 or 4.

Senator WATKINS. Mr. Phillips, that is a very fine paper on the way the development of soil and water conservation in the United States is being taken care of under the Department of Agriculture.

Do you know whether Russia has anything comparable to our water development under the Soil Conservation Service small watershed program?

Mr. PHILLIPS. According to the information we have there is nothing of that sort.

Senator WATKINS. Of course, in making an overall appraisal of the conserving of our water resources you have to take into account this very excellent program for water conservation on the farms and in the small watersheds.

Mr. PHILLIPS. We think that is the key to the planning and use of the Nation's water supply.

Senator WATKINS. There is no doubt but what it plays an important part. I may have disputed some phases of that program, but I personally believe it is one of the most important parts of the water conservation program.

The study that the committee has been making in this particular hearing is with reference to the situation in the United States compared to that in Russia.

We felt that in order to have a proper understanding of just what is being done in the United States we should call in the Interior Department, the Federal Power Commission, and the Department of Agriculture to tell the story as they know it with respect to water development.

I have never read of any comparable program in Russia which compares to our soil and water conservation program in the Department of Agriculture.

Thank you very much.

I may say of the other papers that were presented here they were very able and they have brought to our attention and we have now made a part of the record the statements of fact which gave us a better understanding of our own Nation's program.

I have the feeling that the presentation before today's hearing was more or less a one-sided one, it did not quite give the whole picture.

I do not mean that it was intended to be one sided but it did not give the whole picture. I felt we ought to have all the facts here.

Does the representative from the Army engineers have any comment to make on the statements that have been made?

STATEMENT OF COL. STANLEY REIFF, EXECUTIVE, CIVIL WORKS OFFICE, CHIEF OF ENGINEERS

Colonel REIFF. I believe not, Mr. Chairman.

Senator WATKINS. You might identify yourself, for the record.

Colonel REIFF. I am Col. Stanley Reiff, executive, civil works office, Chief of Engineers.

General Itschner is sorry he was not able to be present this morning.

General Person, Assistant Chief of Engineers for Civil Works, is still out of town.

I am here at the request of the chairman as an observer. I believe the corps has no further statement to make than that which was made by General Itschner in the first place, Mr. Chairman.

Senator WATKINS. I am sure the committee appreciates your appearance this morning, your willingness to come and observe.

If we desire to ask further questions, you no doubt will respond.

I have no questions to ask you on the matter, but I do appreciate also the information that was brought by the Army engineers to this committee.

You brought such information as you were asked to bring to lay out policy and I think you responded very well.

I still say that we did not have quite the complete picture and I think now it is much better rounded out than it was before.

I do not know whether we have it all now, because it is difficult in a large country, and with so many activities going on, to get all of the statistics in so that you can have them up to date almost to the very hour of the very month you are making the investigation.

Thank you, gentlemen, for your appearance here. I believe I am instructed by the chairman who designated me as the chairman to end the hearings now. That is the order. The committee will be in recess.

(Thereupon, at 11:45 a. m., the Joint Committee was adjourned.)

APPENDIX

(The following exhibits were submitted by Mr. Clyde T. Ellis, general manager of National Rural Electric Cooperative Association, in response to requests by members of the committee:)

Electrification loans comparison of budget estimates with funds authorized, fiscal years 1949–57

Year	Budget request		Congress authorized	
	Regular	Reserve	Regular	Reserve
1949	$300,000,000		$400,000,000	
1950	350,000,000		350,000,000	$150,000,000
1951	400,000,000		[1] 264,500,000	[2] 39,182,305
1952	100,000,000		100,000,000	75,000,000
1953	50,000,000	$50,000,000	50,000,000	50,000,000
Subtotal	1,200,000,000	50,000,000	1,164,500,000	314,182,305
1954 [3]	135,000,000	60,000,000	135,000,000	45,000,000
1954 [4]	95,000,000	60,000,000		
1955	55,000,000	35,000,000	135,000,000	35,000,000
1956	160,000,000	35,000,000	160,000,000	100,000,000
1957	145,300,000	25,000,000	[5] 214,000,000	
1957, supplemental request (Mar. 12, 1957)	200,000,000		[6] 414,000,000	
1958	179,000,000		[7] 179,000,000	
Subtotal	[8] 834,300,000	[8] 155,000,000	[9] 1,023,000,000	180,000,000

[1] Congress authorized a new loan authorization of $350,000,000. However, the appropriation act included a provision requiring that reductions be made in the various appropriations and loan authorizations included in the act. Under subsequent legislation the authorization for electrification loans was reduced to $264,500,000.

[2] Congress authorized a reserve authorization of $150,000,000 which was to include the uncommitted balance of reserve authorization available as a carryover from the fiscal year 1950. The carryover into 1951 of $139,957,974 included an uncommitted balance from the 1950 reserve authorization of $110,817,695.

[3] Truman estimate.

[4] Eisenhower estimate.

[5] Congress provided a new loan authorization of $214,000,000 with a provision that not to exceed $25,000,000 be placed in reserve until needed June 4, 1956.

[6] Regular authorization of $214,000,000 provided in Public Law 554 dated June 4, 1956. Supplemental authorization of $200,000,000 provided in Public Law 85-15 dated Apr. 16, 1957.

[7] Congress provided a new loan authorization of $179,000,000 with a provision that not to exceed $20,000,000 be placed in reserve until needed.

[8] 1954: includes Eisenhower requests only.

[9] 1957: $214,000,000 authorized June 4, 1956, included in the $414,000,000 so not reflected in subtotal.

Source: Rural Electrification Administration.

22325—58——13

Average monthly kilowatt-hour consumption per farm consumer by calendar years, 1948–56, REA distribution-type borrowers

	1948	1949	1950	1951	1952	1953	1954	1955	1956
United States	121	134	146	165	184	203	226	246	270
Alabama	89	99	111	128	149	169	194	216	239
Arizona	128	136	131	151	172	200	222	246	269
Arkansas	60	67	72	82	93	104	117	124	140
California	255	302	321	365	423	459	485	494	539
Colorado	135	162	180	197	216	236	258	278	296
Connecticut									
Delaware	164	162	181	205	224	246	261	289	313
Florida	79	92	106	121	139	158	175	191	208
Georgia	91	104	119	139	163	188	212	234	264
Idaho	191	222	250	287	324	356	398	459	505
Illinois	147	165	178	198	217	239	262	285	305
Indiana	154	177	200	225	252	277	302	328	348
Iowa	190	219	245	279	299	324	363	403	427
Kansas	128	140	146	164	180	195	219	237	258
Kentucky	94	106	116	134	155	167	186	204	228
Louisiana	58	68	76	85	94	105	117	129	147
Maine	70	84	94	103	112	121	128	140	146
Maryland	128	133	141	159	178	201	213	229	245
Massachusetts									
Michigan	142	157	173	193	213	235	259	283	308
Minnesota	185	208	223	251	272	299	331	354	388
Mississippi	75	85	95	103	115	127	143	155	172
Missouri	93	102	107	119	131	143	158	170	186
Montana	186	238	283	320	357	376	422	469	501
Nebraska	167	184	189	217	243	269	304	344	358
Nevada	580	637	677	696	748	790	869	901	898
New Hampshire	127	148	157	172	189	208	217	235	251
New Jersey	257	281	302	338	369	388	417	405	376
New Mexico	98	112	116	130	141	154	174	188	204
New York	174	203	218	245	270	300	327	349	377
North Carolina	66	77	87	104	123	144	165	185	212
North Dakota	182	177	173	194	220	248	282	316	344
Ohio	163	190	217	245	271	299	328	355	379
Oklahoma	87	96	98	106	117	128	147	151	171
Oregon	235	279	318	362	431	475	527	592	661
Pennsylvania	145	169	192	216	245	276	310	335	369
Rhode Island									
South Carolina	78	92	104	119	137	154	171	187	209
South Dakota	165	163	153	178	198	219	245	275	301
Tennessee	140	154	171	200	226	250	282	310	346
Texas	76	88	100	115	127	141	158	168	186
Utah	183	140	161	194	228	248	261	279	296
Vermont	173	191	197	207	236	261	282	310	345
Virginia	92	103	112	128	144	156	173	185	206
Washington	357	429	461	511	605	645	706	795	847
West Virginia	75	81	88	99	109	116	129	143	157
Wisconsin	168	188	210	240	274	314	355	380	422
Wyoming	163	187	205	226	247	271	296	313	338
Alaska	119	136	116	182	242	308	372	423	465

Source: Statistical Services Section, Administrative and Loan Accounting Division, July 19, 1957.

Average monthly kilowatt-hour consumption per total consumer by calendar years, 1948–56, REA distribution-type borrowers

	1948	1949	1950	1951	1952	1953	1954	1955	1956
United States	153	166	180	206	230	254	285	312	345
Alabama	160	159	171	194	213	221	248	268	299
Arizona	324	321	363	531	642	818	811	816	857
Arkansas	83	94	97	111	117	134	171	173	186
California	249	295	312	340	375	400	429	433	445
Colorado	192	199	235	263	292	322	385	400	457
Connecticut									
Delaware	161	155	168	189	204	223	239	262	284
Florida	121	133	146	160	179	198	220	239	261
Georgia	105	116	131	155	182	208	233	256	288
Idaho	224	264	281	324	378	441	570	639	697
Illinois	156	174	193	218	245	272	301	329	363
Indiana	155	178	201	226	252	278	303	327	353
Iowa	187	215	240	273	292	317	357	398	420
Kansas	132	150	158	176	201	221	250	276	311
Kentucky	113	124	136	156	182	205	228	249	277
Louisiana	73	86	93	101	111	124	138	177	205
Maine	66	78	88	94	99	102	110	117	127
Maryland	176	178	183	240	309	335	346	362	393
Massachusetts									
Michigan	153	166	169	181	192	208	223	230	245
Minnesota	192	208	220	243	263	283	310	327	351
Mississippi	130	139	158	174	185	201	230	259	293
Missouri	147	185	189	207	217	233	265	293	322
Montana	247	278	312	343	382	414	466	511	546
Nebraska	243	230	206	234	265	305	350	396	429
Nevada	723	766	844	939	1,022	1,040	1,104	1,132	1,128
New Hampshire	112	101	89	95	105	109	114	128	139
New Jersey	182	199	184	219	194	240	265	225	230
New Mexico	292	244	243	327	342	386	393	423	502
New York	172	199	208	229	251	273	292	308	325
North Carolina	84	93	103	124	146	169	193	215	240
North Dakota	186	189	180	190	216	241	274	308	337
Ohio	173	195	220	247	273	298	325	366	392
Oklahoma	104	111	113	123	136	157	187	203	241
Oregon	315	377	473	620	649	668	725	805	900
Pennsylvania	137	155	170	189	212	235	263	275	299
Rhode Island									
South Carolina	86	100	114	130	150	169	188	204	229
South Dakota	161	152	152	175	195	214	238	267	290
Tennessee	280	279	301	355	386	417	456	498	561
Texas	96	113	130	153	178	209	237	261	305
Utah	171	201	238	313	395	430	446	494	558
Vermont	153	165	169	177	195	215	231	230	250
Virginia	116	126	136	151	165	178	191	209	230
Washington	417	474	546	626	867	1,005	1,106	1,178	1,156
West Virginia	81	86	98	110	116	124	139	151	165
Wisconsin	166	184	204	236	268	309	344	360	388
Wyoming	233	260	278	284	315	363	457	498	617
Alaska	208	221	185	219	239	401	421	409	409

Source: Statistical Services Section, Administrative and Loan Accounting Division, July 19, 1957.

Increase in purchases of wholesale electricity by REA borrowers, 1953–56

State	1953 kilowatt-hour	1956 kilowatt-hour	Average annual increase
			Percent
Alabama	470,786,616	617,771,700	9.4
Arizona	82,679,585	120,618,100	13.5
Arkansas	263,558,263	511,198,200	24.8
California	21,588,321	27,198,500	8.0
Colorado	226,259,900	406,249,400	21.4
Delaware	23,151,000	33,345,000	12.9
Florida	109,854,782	189,329,000	19.8
Georgia	609,999,166	928,222,800	15.2
Idaho	67,433,713	124,295,700	22.8
Illinois	444,721,868	610,182,700	11.1
Indiana	525,975,736	707,236,000	10.2
Iowa	552,974,425	752,649,800	10.8
Kansas	208,683,153	293,713,700	12.1
Kentucky	512,954,039	767,634,900	14.5
Louisiana	159,272,440	239,033,400	14.5
Maine	5,656,687	6,900,000	6.9
Maryland	107,323,880	160,581,200	14.2
Michigan	137,108,227	196,138,400	12.7
Minnesota	645,981,109	869,485,900	10.2
Mississippi	567,568,921	871,165,000	15.4
Missouri	573,752,062	773,648,200	10.5
Montana	166,204,226	267,358,200	17.3
Nebraska	348,178,078	542,878,700	14.8
Nevada	10,319,667	11,440,000	3.2
New Hampshire	32,921,140	40,725,500	12.3
New Jersey	8,785,000	12,472,500	12.4
New Mexico	125,134,575	245,102,500	24.1
New York	16,682,707	20,750,300	7.5
North Carolina	351,633,477	555,731,200	16.4
North Dakota	192,013,416	297,582,500	15.7
Ohio	465,659,540	645,697,000	11.6
Oklahoma	238,083,858	353,027,400	14.0
Oregon	248,391,884	380,300,200	15.2
Pennsylvania	191,447,589	271,747,400	12.4
South Carolina	262,530,925	385,095,300	13.4
South Dakota	173,775,957	281,096,800	17.2
Tennessee	1,521,656,992	2,166,569,600	12.7
Texas	851,709,580	1,280,144,800	14.5
Utah	8,761,770	9,737,700	3.5
Vermont	15,027,008	19,979,600	10.0
Virginia	192,101,034	301,628,800	16.2
Washington	336,102,789	467,455,600	11.6
West Virginia	5,103,900	5,357,600	1.6
Wisconsin	294,926,183	409,971,200	11.6
Wyoming	72,140,755	142,433,300	25.4
Alaska	11,893,872	52,284,600	64.0
Total all borrowers, United States and Alaska	12,458,469,815	18,373,165,900	13.8

Source: Annual Report of Energy Purchased by REA Borrowers, 1953–1956, REA.

Percentage distribution of the source of revenue of the rural electric cooperative, by class of consumer, 1946–56

Type of consumer	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
Farm consumers	70	70	71	73	61	62	62	61	59	52	51
Nonfarm residents	10	11	11	10	22	21	20	21	21	28	27
Commercial and small power	11	11	11	10	10	10	10	10	11	11	11
Large power	4	5	4	4	4	4	4	4	5	5	6
Other [1]	5	3	3	3	3	3	4	4	4	4	5
Total	100	100	100	100	100	100	100	100	100	100	100

[1] Includes irrigation sales and sales to other REA borrowers.

Source: Rural Electrification Administration, annual statistical reports, 1946–56.

Average number of consumers served by REA borrowers, by type of consumer, 1956

Type of consumer	Number	Percent of total
Residential town	281,701	6.7
Residential nonfarm rural	1,074,261	25.4
Residential seasonal cottages	85,381	2.0
Farms	2,431,795	57.5
Schools, halls, and churches	85,715	2.0
Small commercial and industrial	228,691	5.4
Large commercial and industrial	9,172	.2
Pump irrigation	26,346	.6
Other utilities	120	
Other electric service	2,485	.1
Other REA borrowers	45	
Public streets and highways	3,497	.1
Total	4,229,209	100.0

Source: Rural Electrification Administration.

UNITED STATES OF AMERICA, FEDERAL POWER COMMISSION

Before Commissioners: Frederick Stueck, Acting Chairman; Seaborn L. Digby and William R. Connole

IN THE MATTER OF UNITED STATES DEPARTMENT OF THE INTERIOR, SOUTHWESTERN POWER ADMINISTRATION

Docket Nos. IT-5971, IT-6056, E-6337, E-6340 and E-6407

ORDER CONFIRMING AND APPROVING RATE SCHEDULES

(Issued August 9, 1957)

Pursuant to the Flood Control Act of 1944 (58 Stat. 887), the Assistant Secretary of the Interior (Secretary) on behalf of the Southwestern Power Administration (SWPA) on November 16, 1956, submitted for confirmation and approval, rate schedules for the sale by SWPA of firm, speaking, interruptible and surplus power and energy for a five-year period (Docket No. IT-5971). In addition, the Secretary requested (1) that the approval of the rates and charges contained in the electric service agreements between SWPA and (a) Texas Power & Light Co. (Docket No. IT-6056); (b) Public Service Company of Oklahoma and Oklahoma Gas and Electric Co. (Docket No. E-6337), and (c) Southwestern Gas and Electric Co. (Docket No. E-6340), be extended for one year; and (2) that the Commission determine that the rates specified in the contract of January 29, 1952 between SWPA and Arkansas Power and Light Co.-Reynolds Metals Co., heretofore approved by the Commission in Docket No. E-6407, are no longer effective and applicable and that the Commission approve the applicability of the peaking power rate schedule in the above filing for service to Arkansas Power and Light Co., in lieu of rates specified in the contract dated January 29, 1952.

SWPA is an agency of the United States established in the Department of the Interior to execute the purposes of the Flood Control Act of 1944 (Flood Control Act) with respect to the disposition of electric power and energy made available to the Secretary of the Interior from the reservoir projects under the control of the Department of the Army (War Department) in the area comprising all of Arkansas and Louisiana and portions of Missouri, Kansas, Texas, and Oklahoma. At the present time, the Department of the Army has constructed and is operating eight such projects in this area, and one other project is under construction and is expected to be in operation in 1958. The installed capacity of these projects when their ultimate capacity is available in 1962 will be 779,500 kw. In addition, SWPA has leased from certain REA generating and transmission cooperatives under long-term agreements, the output of three steam-electric generating plants, with a total capacity of 85,000 kw.

These projects and steam plants, with the exception of the isolated Narrows and Whitney Projects located in Arkansas and Texas respectively, compose an integrated system, interconnected by the transmission lines owned by SWPA

and the transmission lines leased from the REA generating and transmission cooperatives in the area.

The greater part of SWPA revenues are received from the sale of power and energy under Rate Schedule A, approved by the Commission on February 13, 1947, for a six-year period as a temporary and interim rate schedule for use during SWPA's development period. The balance of its revenues are received from the sale of power pursuant to special contracts. The initial approval of Rate Schedule A and the rates and charges set forth in the special contracts involved in this filing, with the exception of those set forth in the contract with Arkansas Power and Light Co.-Reynolds Metals Co., expired, but have been extended from time to time to allow SWPA to file revised rate schedules.

Rate Schedule A has proved to be too low to produce the revenues needed to meet payout requirements under the Flood Conrtol Act. In fiscal years 1954 and 1955, SWPA's revenues were insufficient to cover interest on investment, and in 1956 revenues failed to cover operating expenses, and are not expected to be adequate in 1957.

Several factors have contributed to SWPA's deficit operations. During the past few years, unprecedented drought reduced its primary hydro energy by 32 percent, and the cost of its projects far exceeded the estimates made at the time Schedule A was put into effect. SWPA has also had difficult marketing problems. Its hydro projects supply peaking power which cannot be used as such by firm customers. In order to supply firm power requirements, SWPA has firmed up its hydro peaking power with steam through service agreements with private companies and through agreements with coperatives to purchase the entire output of three steam generating plants. In addition, SWPA has entered into agreements with cooperatives in the area to lease some 2,300 miles of cooperative-built transmission and distribution lines in order to market the power. Under these arrangements, SWPA is able to meet the high load factor requirements of public bodies and cooperatives, thereby encouraging the most widespread use of its hydro outputs. These added costs however, are not provided for under Rate Schedule A.

In order to obtain additional revenue, the Secretary now requests approval for ea five-yar period, of four rate schedules to supersede SWPA's Rate Schedule A. The proposed rate schedules are designated as Rate Schedule F–1, for wholesale firm power service; Rate Schedules P–1, for wholesale peaking power service; Rate Schedule IC, for wholesale interruptible capacity and Rate Schedule EE, for wholesale excess energy. The rates and charges provided in each of these rate schedules are described briefly as follows:

Rate Schedule F–1—Firm Service

Demand Charge—$1.60 per kw. of monthly billing demand.
Energy Charge—2 mills per kw.-hr. for the first 150 kw.-hr. per kw. of billing demand.
3 mills per kw-hr. for the next 290 kw.-hr. per kw. of billing demand.
5 mills per kw-hr. for the energy in excess of 440 kw.-hr. per kw. of billing demand.

Provision if made for discounts of 10¢ and 40¢ per kw. of billing demand where, under specified conditions, the customer provides respectively—(a) transformation and substation facilities, and (b) transmisison facilities. Under this rate schedule, SWPA supplies the cutsomer's total requirements except, where a customer utilizes an auxiliary source of power, the energy supplied may be limited in each billing period to an amount proportionate to the ratio of the customer's contract demand and its annual maximum power requirement, and the use of such energy shall generally parallel the normal load patterns of the customer's system load.

Rate Schedule P–1—Peaking Service

Demand charge—$1.60 per kw. of monthly billing demand.
Energy Charge—2 mills per kw-hr. for the first 150 kw.-hr. per kw. of billing demand.
3 mills per kw.-hr. for the next 50 kw.-hr. per kw. of billing demand.

Energy associated with peaking power will be made available in the amount of 1,800 kw.-hr. per kw. of contract demand during each fiscal year beginning July 1 of each year, except that an additional amount up to a total of 2,400 kw.-hr. per

kw. per fiscal year may be made available where the customer can demonstrate need therefor.

The energy charges shall be applied so that notwithstanding monthly variations in the delivery of energy permitted by contract, the energy charge shall be 2 mills per kw.-hr. for the first 1,800 kw.-hr. per kw. of contract demand for fiscal year and 3 mills per kw-hr. of energy in excess of 1,800 kw.-hr. per kw. of contract demand per fiscal year. Also, provision is made for the same discounts available under Rate Schedule F–1.

Rate Schedule IC—Interruptible Service

Demand Charge—4.5¢ per kw. per day of interruptible capacity.

Rate Schedule EE—Excess Energy

Energy Charge—1.5 mills per kw.-hr. of excess energy.

Rate Schedule F–1, applicable to firm sales, will account for about 2/3rds of SWPA's revenues. At 50 percent load factor, the average rate under this schedule is 6.97 mills per kw.-hr. as compared with 5.51 mills per kw.-hr. under the present schedule. This is an increase of 27 percent.

SWPA also proposes to apply its new peaking service Rate Schedule P–1 to serve furnished under Arkansas Power and Light Co.-Reynolds Metals Co. contract. Charges for this service would account for about 1/6th of SWPA's revenues; the remaining 1/6th of SWPA revenues are expected to be derived from the sale under the P–1 Schedule of peaking service and additional capacity to other customers.

The Secretary submitted with the filing a repayment study which contains the primary support of the proposed rates. It sets forth the annual cost of seven integrated hydro projects,[1] the leased REA cooperative steam plants, and the SWAP's transmission system including the transmission lines leased from the REA cooperatives. The repayment study purports to show that each hydro project will pay out within 50 years after its in-service date. Since it is estimated that the last of the projects will be completed in 1962, the pay out will be completed in the year 2011.

The repayment study shows that the pay out for the integrated system will be deficient until 1962, when the ultimate capacity of the integrated system will be available. In 1957, the year of maximum deficiency, estimated revenues at present rates fall $859,100 short of covering even operating expenses. Commencing in fiscal 1958, assuming that the proposed rates are then in effect, the annual deficit decreases each year until 1962, when revenues are expected to recover all costs.

Project investments allocated to power by SWPA, are the most recent made by the U. S. Corps of Engineers and are derived by the separable costs-remaining benefits method for all projects except Denison and Norfolk, for which allocations are based on the incremental method. The total investment of the hydro projects in the integrated system and SWPA's transmission lines is amortized over a 50-year period beginning in 1962. Interest charges are computed at 2½ percent. SWPA includes in its operating expenses all amounts incurred for the leasing of facilities from the cooperatives, including the amount sufficient to amortize in approximately 28 years at 2 percent interest, the investment in the transmission facilities.

Assuming that all of its resources can be sold as shown in its repayment study, it appears to the Commission that SWPA's proposed rates will recover costs commencing in 1962, and appear to be equitable in the face of SWPA's difficult marketing problems.

The three electric service agreements between SWPA and Texas Power & Light Co. (Docket IT–6056). Public Service Company of Oklahoma and Oklahoma Gas and Electric Co. (Docket No. E–6337), and Southwestern Gas and Electric Co. (Docket No. E–6340), are arrangements under which peaking power is supplied to the companies who in turn firm up a portion of such

[1] The isolated Narrows and Whitney projects are accounted for separately from SWAP's integrated system. The rates and charges applicable to the Whitney project have been approved by the Commission until December 23, 1959, and are not involved in the present filing. The rates and charges applicable to the Narrows Project are contained in the contract with Southwestern Gas & Electric Co. (Docket No. E–6340).

power and supply firm service for SWPA's account to its customers from the companies' transmission systems. The agreements provide for the companies to pay for the services rendered to SWPA and in turn to receive credits for the services they render to SWAP's customers. The Secretary states that in order to bring the compensation to the Government under these agreements in line with the proposed rate schedules, it is the intention of SWPA to renegotiate them in the very near future. In order to allow the time for such renegotiation it is requested that the Commission's approval of the rates and charges in these agreements be continued for a period not to exceed one year.

The renegotiation of the agreement with Texas Power & Light Co. has been completed and on April 2, 1957, the Secretary submitted for Commission approval revised rates and charges contained in a supplemental agreement with the Company. This matter is now pending before the Commission.

Under the amended agreement with Arkansas Power and Light Co., and Reynolds Metals Co. (Docket No. E–6407) SWPA sells 150,000 kw. and 30,000,000 kw.-hr. per month to Arkansas Power and Light Co., which in turn sells 110,000 kw. of high load factor power to Reynolds Metals Co. The average rate to Arkansas Power and Light Co. may increase over the 30-year term of the agreement from 5.2 to 6.37 mills per kw.-hr. In addition, SWPA sells Arkansas Power and Light Co. secondary energy at rates which may increase from 1.25 to 2.00 mills per kw.-hr. during the term of the agreement. The Commission, on April 28, 1952, approved the rates and charges set forth in the amended agreement, which the Secretary had entered into on behalf of SWPA for a term of 30 years.

The Secretary requests that the Commission determine that the rates specified in the above contract are no longer effective and applicable. This request implies that the Commission has some power or authority over contracts entered into by the Secretary in carrying out his function of marketing the power generated at Federal projects specified in the Flood Control Act of 1944. It should be noted that the Commission has always made it clear in its orders that it was passing only on the rate schedules submitted or the rates and charges proposed in specific agreements, which is the extent of its authority pursuant to the Flood Control Act of 1944.

Section 5 of the Flood Control Act delegates the function of marketing and disposing of electric energy to the Secretary of the Interior. The authority of the Commission is confined to the function of approving or disapproving rates submitted by the Secretary for future application which he will use in the marketing of the power. In order to comply with the request of the Secretary to determine that rates specified in a contract which he has heretofore entered into are no longer effective, some power of adjudication would have to exist in the Commission over such contracts. No such authority is delegated to the Commission under the Flood Control Act nor under any other acts of Congress. Therefore, the Secretary's request in this regard must be dismissed.

The Commission may approve rate schedules designed by the Secretary for the general disposition of power on a systemwide basis for different classes of service, and on the assumption that they will be applied in the future to anticipated loads or to present loads where the rate schedule would be applicable, but the actual application of rate schedules to the sale of electric power is a function and responsibility delegated to the Secretary of the Interior and over which this Commission has no authority or jurisdiction.

The repayment study is on the basis of applying the proposed P–1 Rate Schedule to SWPA's sales to the Arkansas Power and Light Co. However, it is also shown that if the Secretary finds, because of contract requirements, he must continue to charge Arkansas Power and Light Co., at the present contract rate, the revenue estimates for 1958 will have to be reduced by $1,098,000 and by lesser amounts for succeeding years totaling $22,000,000 for the remaining years of the contract which amount is not proposed to be recovered by the application of the proposed rate schedules to other customers.

Notice of the request for approval of the proposed rates and charges was sent to State officials and other interested parties and published in the Federal Register on December 1, 1956 (233 FR 9439), stating that any one desiring to make comments or suggestions for Commission consideration should submit same on or before December 17, 1956, which date was extended to January 21, 1957.

Petitions to intervene and protests were filed by Arkansas Power and Light Co., Reynolds Metals Co., and the Advisory Committee on Power for the Southwest. In addition, Arkansas Power and Light Co., and Reynolds Metals Co. filed replies to the Secretary's memorandum stating his views regarding the

legal analysis of the validity of the rate provisions in the Arkansas Power and Light Co.-Reynolds Metals Co. contract. Comments and protests were received from 15 Rural Electric Cooperative Associations, including the National Rural Electric Cooperative Association, four municipalities, the Southwest Power Pool and Associated Companies and 31 Members of the Congress. Most of the Members of the Congress requested that the Commission delay action on the proposed rate schedules until Congress has had the opportunity to take further legislative action regarding the basis for the determination of rates under the Flood Control Act. Regarding this request it should be noted that the Commission has the duty and responsibility to carry out its function of approving or disapproving rates filed by the Secretary as promptly as circumstances permit. Indefinite delay would completely negate the purpose of section 5 of the Flood Control Act. Only Congress may do that by further legislation.

The Flood Control Act does not require or provide for hearings before the Commission in carrying out its function of passing on the rates submitted by the Secretary. The disposition and sale of power under the Flood Control Act constitutes a function of disposing of public property and as such is exempted from the requirements of the Administrative Procedure Act (5 U. S. C. 1003). The function delegated to the Commission by the Flood Control Act is that of reviewing the proposed action of the Secretary and is not the function of determining the legal rights of others. The Commission's orders under the act are directed only to the Secretary and it has no authority to issue orders directed to others. Thus, the petitions to intervene and the requests for hearing should be dismissed.

As stated above, protests, comments, and suggestions were filed in response to the published notice. All of these have been considered by the Commission.

The Commission finds:

(1) The proposed Rate Schedules F–1, for wholesale firm power service; P–1, for wholesale peaking power service; IC, for wholesale interruptible capacity; and EE, for wholesale excess energy all as referred to above, when applied to the disposition of SWPA's power and energy resources, will conform with the standards set forth in Section 5 of the Flood Control Act of 1944.

(2) It is appropriate for the purposes of the Flood Control Act of 1944 that the approval of the rates and charges contained in the agreement between SWPA and Texas Power & Light Co., dated April 4, 1947 (Docket No. IT–6056) be extended until such time as the Commission has taken action on the revised rates and charges contained in the supplemental agreement filed for Commission approval April 2, 1957; and that the approval of the rates and charges contained in the agreement with Public Service Company of Oklahoma and Oklahoma Gas and Electric Co. (Docket No. E–6337), and in the agreement with Southwestern Gas and Electric Co. (Docket No. E–6340), be continued for a period not to exceed one year from the date of this order pending the renegotiation of these agreements.

The Commission orders:

(A) The proposed SWPA's Rate Schedules F–1, P–1, IC, and EE filed November 16, 1956, to supersede SWPA's Rate Schedule A, are confirmed and approved for a period of five years from the date of this order.

(B) The approval of the rates and charges contained in the agreement between SWPA and Texas Power & Light Co., dated April 4, 1947 (Docket No. IT–6056), be extended until such time as the Commission has taken action on the revised rates and charges contained in the supplemental agreement filed for Commission approval April 2, 1957; and the approval of the rates and charges contained in the agreement with Public Service Company of Oklahoma and Oklahoma Gas and Electric Company (Docket No. E–6337), and in the agreement with Southwestern Gas and Electric Co. (Docket No. E–6340), be continued for a period not to exceed one year from the date of this order.

(C) That the request of the Secretary that the Commission determine that the rates specified in the contract between SWPA and Arkansas Power and Light Co.-Reynolds Metals Co. (Docket No. E–6407), are no longer effective and applicable, is dismissed for reasons stated above.

(D) The petitions to intervene filed by Arkansas Power & Light Co., Reynolds Metals Co., and the Advisory Committee on Power for the Southwest and the requests for hearing, are dismissed for reasons stated above.

By the Commission.

JOSEPH H. GUTRIDE, *Secretary.*

ATOMIC POWER—INDUSTRY ASKS MORE GOVERNMENT HELP TO SPEED PROGRAM

[From Time magazine]

To bolster free-world defenses, the administration last week urged Congress to rewrite the Atomic Energy (MacMahon) Act to give United States allies more atomic-weapons information, more nuclear material. But, to many United States businessmen, a stronger atomic defense is only one side of the coin. They want some equally drastic changes in the United States atomic-energy program to develop commercial power for use throughout the power-hungry world. While AEC Chairman Lewis L. Strauss maintains that the commercial program is clipping right along, experts in Congress and industry disagree; they insist that commercial nuclear power must be sped up, or else the United States will fall far behind other nations.

The main argument is over how much help the United States Government should give private industry. AEC's position is that nuclear power for peaceful purposes should be largely a private venture, with AEC supplying only limited funds. Originally, businessmen supported the idea, lest nuclear energy grow into a giant public-power program. Now, their position has changed. Even the stoutest private-power men feel that the program needs a strong infusion of Government aid because commercial nuclear power is so new, so complex, and so costly that private companies cannot carry the burden alone. Says President Newton I. Steers, Jr., of the Atomic Development Mutual Fund, Inc. (assets, $45 million), a onetime AEC official and longtime private-owner advocate: "There isn't a reactor manufacturer in the United States who doesn't favor Government assistance to get them over the hump."

The big hump is the fact that conventional United States power is so cheap and nuclear power so expensive that the United States itself has no pressing domestic need for a crash program. Thus, AEC orients its program toward the laboratory, has considered well over 100 different ways of producing nuclear power, and is concentrating on small experimental reactors to test the most likely methods. AEC hopes to foster an industry producing possibly 95 million kilowatts of nuclear power by 1980, or 25 percent of the estimated total power demands of the United States. But United States industry is learning, to its sorrow, that there is a vast gulf between atomic power in the lab and in commercial quantities. Costs have shot up to the point where they discourage even the richest companies.

The one large nuclear powerplant completed to date, the 60,000-kilowatt station built by Westinghouse Electric Corp. for AEC and the Duquesne Light Co. of Shippingport, Pa. (Time, November 25), is a major milestone for the United States—and a perfect example of the cost problem. Westinghouse's original cost estimate was $37.8 million. The plant will ultimately cost about $100 million. The Government paid 95 percent of the bill to get it operating; the power produced is so expensive that AEC also pays a heavy subsidy to make it marketable.

There is no such heavy Government aid for the 16 privately sponsored plants, which comprise the bulk of the program. Builders are largely on their own, working under fixed-price contracts with risk of heavy losses. As a result, 1 small experimental plant is completed, only 4 are under construction. Two others have been contracted for, but negotiations with AEC for another 5 are poking along, and 4 more have been canceled.

Even the biggest companies find the going rough. General Electric originally put a price of $45 million on the Dresden, Ill., nuclear power plant (180,000 kilowatts) a building for Chicago's Commonwealth Edison Co.; costs already exceed that by an estimated $20 million. By the time it is finished, GE will be $80 million in the hole on its nuclear program, including a smaller 5,000-kilowatt plant it built at Pleasanton, Calif., to get experience. GE, like the others, thinks that if it could build three big plants in a row, it could learn enough to produce competitive power. But GE has no plans at the moment. As one reactor builder says: "Private industry has found that there is no money in atomic energy and no prospect of making any money."

Result: United States industry is not getting the experience it needs. Says Westinghouse Vice President Charles H. Weaver: "We should accumulate 100 units of operating experience by the end of 1964. But by the end of 1957, we had accumulated only about one unit of experience. And it will not be until 1962 at the earliest that we start getting any substantial operating experience."

For United States consumers, the lag in the commercial nuclear program is no great worry. With plenty of coal, oil, and gas, the United States can afford to wait. But what may not be economic for the United States is often economic for other nations with less resources. Britain, whose conventional-power costs

are estimated at double those in the United States (7½ mills per kilowatt-hour), needs nuclear power right now; so do many other nations. Britain is going ahead under a nationalized program to build the actual powerplants. It has been operating its Calder Hall plant, half again as big as Shippingport, for more than a year, is building 3 more with better than 200,000 kilowatts, and a fourth with 500,000 kilowatts, versus only 180,000 kilowatts for the biggest United States plant.

By 1964, say Britons, domestic nuclear energy will total 6 million kilowatts versus only 1.6 million for the United States. The British have also landed a contract for a $72 million, 200.000-kilowatt powerplant in Italy, expect to sew up at least 5 other foreign contracts totaling about $500 million by the end of 1958. Target for 1967: the bulk of the business from Europe's 6-nation Euratom combine, whose purpose is to build a common nuclear-power grid of 15 million kilowatts. Russia is reportedly building a 150,000-kilowatt plant for Czechoslovakia, a 100,000-kilowatt plant for East Germany, and two 400,000-kilowatt plants for herself—all to be completed by 1960.

By contrast, United States manufacturers have only eight powerplant contracts around the world, most of them small. In addition to costs, AEC tightly restricts sales of enriched uranium, needed for United States-designed plants, refuses to guarantee foreign nations all they need; Britain, on the other hand, gives a lifetime fuel guaranty with each contract. Still another complaint is insurance. British underwriters have banded together to form the British Insurance (Atomic Energy) Committee to write a plan for insuring foreign nuclear plants. The United States, while it has finally developed a joint Government-private insurance program for domestic reactors, has no plan to extend coverage to prospective customers abroad.

There is little doubt among nuclear experts that the United States must push ahead much faster than Atomic Energy Chairman Strauss is willing to go. Last week, AEC was trying to work out a compromise plan to supply more funds to private industry for research and development. The need is bigger than that. One comprehensive plan was laid out recently by Willis Gale, chairman of Chicago's Commonwealth Edison Co., which will operate the big Dresden power station in 1960. Chairman Gale dismisses the public- versus private-power argument by prefacing his plan with the suggestion that Government aid go both to public and private power combines in roughly the same proportion as their share of current United States electric output. He wants a big increase in the number of big nuclear powerplants, wants utilities to put the same amount of money in each plant as they would in big conventional plants. But until nuclear power becomes competitive with present power, he wants the Federal Government to make cash contributions to pay most of the difference between nuclear- and conventional-power construction costs. Says Gale: "The only way our country can achieve competitive nuclear power is through the building of a series of full-scale plants like Dresden. Our program must be accelerated."

NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION,
Washington, D. C., February 20, 1958.

Hon. JOSEPH O'MAHONEY,
Chairman, Joint Subcommittee, Senate Committees on Interior and Insular Affairs and Public Works, Senate Office Building,
Washington, D. C.

DEAR JOE: The following information is submitted in reply to the questions asked of me on February 18, 1958, by Senator Barrett, of Wyoming, during the hearings on Senate Resolution 248.

There is submitted herewith, for the record, a copy of a table, and letter of transmittal dated June 5, 1957, from the Legislative Reference Service, Library of Congress, to Congressman Steed, of Oklahoma. This table purports to show the amount of Federal funds expended for electric power facilities and related development during the fiscal years 1946–57. It appears from this table that the amount of funds so expended increased each year between 1946 and 1953, but decreased each year between 1954 and 1957.

There is also submitted for the record a table identified as table I which was prepared in this office. It shows the Budget Bureau recommendations, appropriations, and expenditures during the fiscal years 1949–59 for each of certain Federal agencies engaged in water-resource development.

There is also submitted for the record a table identified as table II which was also prepared in this office. It is a summary of table I and shows total Budget Bureau recommendations, appropriations, and expenditures during the fiscal years 1949–59 for major Federal agencies engaged in water-resource development.

It appears, to us at least, that an examination of table I and table II attached justifies the conclusion that during the fiscal years 1954–59, Budget Bureau recommendations especially, but also appropriations and expenditures for these agencies, were generally substantially below parallel figures for the fiscal years 1949–53. In this connection, your attention is respectfully called to the rather widely divergent budget recommendations submitted by two successive Presidents for the fiscal year 1954.

With respect to the Colorado River storage project, I must disagree with Senator Barrett's opinion that it is the largest ever authorized. Allow me to respectfully call your attention to table III attached which was prepared in this office. It compares the magnitude of some of the salient parallel features of the Colorado River storage project, authorized in 1956, and the Missouri River Basin project authorized in 1944. It appears that the Missouri River Basin project is substantially larger as measured by total estimated cost, total hydroelectric capacity or land area to be irrigated.

What Senator Barrett may have meant is that the Colorado River storage project legislation contained the largest authorization for expenditure of reclamation funds ever contained in a single act.

Moreover, I respectfully call your attention to the fact that the Colorado River storage project, as authorized, is not the project as originally contemplated insofar as the interests of the rural electric systems are concerned.

As you know, the 200,000-kilowatt Echo Park Dam was not authorized, nor were the hydroelectric features of the San Juan-Chama diversion project.

In addition, there is considerable doubt as to whether the rural electric systems will ever receive substantial benefits from the hydroelectric features of the project that has been authorized.

It is true that the Colorado River storage project legislation does contain an authorization for transmission lines in the following language:

"*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled*, That * * * the Congress * * * hereby authorizes the Secretary of the Interior (1) to construct, operate, and maintain * * * reservoirs, powerplants, transmission facilities, and appurtenant works * * *."

But an authorization is, however, permissive only. The subject of the authorization can only be achieved after subsequent congressional appropriation of necessary funds. This, of course, is true of Federal transmission lines, and appropriations for them generally follow recommendations of the Secretary of the Interior. Had Congress said nothing more regarding transmission facilities than is contained in the language above, there would be reason to anticipate at least some Federal transmission lines for the project.

However, the House Committee on Interior and Insular Affairs, in reporting the Colorado River storage bill, inserted in its report restrictive language which, in my opinion, seriously restricts the effectiveness of the transmission facility authorization. The Committee said:

"Representatives of the 10 private power companies operating in the area presented testimony before the committee indicating their desire to cooperate with the Federal Government in the transmission and marketing of electric power and energy from the Colorado River storage project. Their proposal provides essentially that the Secretary construct the backbone transmission lines connecting major powerplants of the project and that use be made of the existing systems of the companies and additions thereto to market the power. The companies assured the committee of their willingness to serve preference customers either through wheeling or through resales with appropriate safeguards to protect the rights and interests of the preference customers, and of the desire of the private utilities of the area to purchase power in excess of that taken by preference customers.

"The proposal by the power companies seemed entirely reasonable to the committee.

"The Department of the Interior advised the committee that it was sympathetic to the private power companies' proposal and indicated that the suggestions

would be given studied consideration if the project were authorized. Therefore, the committee expects the proposal by the private power companies for cooperation in the development to be carefully considered by the Department of the Interior and the electric power and energy of the project to be marketed, so far as possible, through the facilities of the electric utilities operating in the area, provided, of course, that the power preference laws are complied with and project repayment and consumer power rates are not adversely affected."

Actually the power company proposal includes interconnecting backbone transmission facilities as well as those lines required to deliver project power to customer delivery points.

This restrictive language inserted by the House committee constitutes an unprecedented restriction as applied to a major river basin development authorization. It affords the power companies a strong basis upon which to oppose all Federal transmission lines proposed for the Colorado River storage project. In my opinion, it also will have considerable influence on the present Secretary of the interior when he negotiates for the sale of project power. Were the authorization of transmission lines, as contained in the bill proper, considered in the absence of this committee language, the Secretary could certainly presume that the Congress intended Federal lines to be constructed. However, after considering the authorization and the committee language together, the Secretary will probably decide that the Congress intended he should recommend Federal lines only if power company owned transmission facilities are not available. The language is thus an open invitation to the negotiation of agreements providing for sale of all project power to the power companies at the dam site. Such agreements usually contemplate neither Federal transmission lines, nor the rights of customer classes that would be served by them.

Nor was the impact of this language deflected by the Senate committee report on the bill.

There is further submitted for the record a table entitled "Table IV," which is attached. Table IV was prepared in this office from material supplied by the Rural Electrification Administration. It indicates Budget Bureau requests and authorizations by Congress for REA electric loan funds for the fiscal years 1949 to 1958, inclusive. Subtotals are shown for the years 1949 to 1953, inclusive, and for the years 1954 to 1958, inclusive.

An examination of the figures contained in table IV indicates clearly that total Budget Bureau requests and authorizations for REA regular electric loan funds during the fiscal years 1949–53 exceeded the parallel total for the fiscal years 1954–58.

We appreciate the opportunity to testify on Senate Resolution 248, and are indeed, happy to be able to furnish the foregoing information in response to the questions that were asked us.

Sincerely,

CLYDE T. ELLIS, *General Manager.*

THE LIBRARY OF CONGRESS,
LEGISLATIVE REFERENCE SERVICE,
Washington, D. C., June 5, 1957.

Hon. TOM STEED,
House of Representatives, Washington, D. C.

DEAR MR. STEED: This is in reply to your letter of May 9, requesting additional comparative data for years prior to 1952 on expenditures for power and related development.

From various sources we have endeavored to provide a breakdown by years, in accordance with your request, starting with the post-World War II year of 1946. For the war years immediately preceding 1946, there was little multiple-purpose dam construction.

These additional data represent the only additional figures readily available to the Library. They should be considered as approximations only. The total, however, should be reasonably accurate and is definitely sufficient to establish the trend of expenditures or costs for the period 1946–56.

Sincerely,

(Signed) WALLACE R. VAWTER,
Senior Specialist in Engineering and Public Works.

Expenditures for power and related development [1]

[In millions of dollars]

Type	1957 (estimated)	1956 (estimated)	1955	1954	1953	1952
Multipurpose dams and reservoirs with hydroelectric power facilities:						
TVA		2.7	6.0	8.1	22.8	32.2
Bureau of Reclamation	49.7	29.2	33.1	54.1	70.5	75.4
Corps of Engineers	164.6	189.2	241.1	271.1	332.9	287.0
International Boundary and Water Commission		1.9	1.4	5.9	13.8	8.0
Total, multipurpose facilities	214.3	223.0	281.6	339.2	440.0	402.6
Steam-electric powerplants, TVA	32.4	79.1	181.6	238.4	152.2	147.7
Power transmission facilities:						
TVA	24.1	21.5	27.9	47.5	33.5	42.1
Bureau of Reclamation	12.0	16.8	16.1	25.0	28.0	34.4
Bonneville Power Administration	24.4	27.7	33.3	41.7	53.4	50.8
Southeastern Power Administration		[2]		[2]	.4	.1
Southwestern Power Administration	1.0	.3	.6	2.8	2.9	3.2
Total, power transmission facilities	61.5	66.3	77.9	117.0	118.2	130.6
Total	308.2	368.4	541.1	694.6	710.4	680.9

	1951	1950	1949	1948	1947	1946
Multipurpose dams and reservoirs with hydroelectric power facilities:						
TVA [3]	31.0	41.8	14.6	3.4	1.5	9.9
Bureau of Reclamation [4] [5]	121.1	59.9	19.4	18.8	7.1	2.8
Corps of Engineers [6]	264.1	236.5	166.2	86.6	44.3	14.5
International Boundary and Water Commission	1.3	.9	1.5	4.0	9.2	1.0
Total, multipurpose facilities	417.5	339.1	201.7	114.8	62.1	28.2
Steam-electric powerplants: TVA [7]	60.7	10.1	1.0			
Power transmission facilities:						
TVA [3]	13.3	16.1	19.6	15.6	6.5	3.5
Bonneville Power Administration	47.6	32.7	24.0	10.6	12.5	
Southeastern Power Administration	1.9					
Southwestern Power Administration	5.4	8.5			7.5	
Total, power transmission facilities	68.2	57.3	43.6	26.2	26.5	3.5
Total	546.4	406.5	246.3	141.0	88.6	31.7

[1] Nonconstruction costs excluded.
[2] Less than $50,000.
[3] Figures for TVA are fixed assets, taken from the Annual Reports of the TVA, fiscal years 1946–51.
[4] Includes transmission.
[5] Figures for Bureau of Reclamation are allocations covering projects completed prior to 1952. Figures do not cover expenditures for partially completed projects. Source: Bureau of Reclamation.
[6] Figures for Corps of Engineers are new costs, taken from the Annual Reports of the Chief of Engineers, fiscal years 1946–51.
[7] Figures for TVA steam-electric plants are taken from the Annual Reports of the TVA, fiscal years 1946–51.

Source for all others: The Budget of the United States Government, fiscal years 1948–53.

TABLE I.—*Budget Bureau requests, appropriations, and expenditures for Federal water resource development programs*

[Millions of dollars]

	Corps of Engineers [1]	Bureau of Reclamation	TVA [2]	Power transmission [3]	Total
1949—Budget recommendation	663	260	35	27	994
Appropriation	629	271	30	28	958
Expenditures	561	244	57	29	891
1950—Budget recommendation	734	380	69	63	1,246
Appropriation	641	373	61	56	1,131
Expenditures	627	298	65	36	1,026
1951—Budget recommendation	800	398	227	86	1,511
Appropriation	623	272	195	83	1,173
Expenditures	611	293	127	44	1,075
1952—Budget recommendation	625	257	250	63	1,195
Appropriation	616	234	238	79	1,167
Expenditures	589	246	229	61	1,125
1953—Budget recommendation	660	228	350	83	1,321
Appropriation	562	206	336	81	1,185
Expenditures	692	228	215	65	1,200
1954—Budget recommendation [4]	662	231	254	80	1,227
Do.[5]	479	133	191	61	864
Appropriation	424	144	189	49	806
Expenditures	502	199	300	53	1,054
1955—Budget recommendation	444	160	142	39	785
Appropriation	442	162	120	33	757
Expenditures	504	163	219	43	929
1956—Budget recommendation	509	180	28	25	742
Appropriation	610	180	27	30	847
Expenditures	536	163	63	42	804
1957—Budget recommendation	582	191	5	35	813
Appropriation	639	198	5	36	878
Expenditures	610	171	95	42	918
1958—Budget recommendation	646	203	15	49	913
Appropriation	645	194	13	41	893
Expenditures (estimated)	630	199	312	41	1,182
1959—Budget recommendation	628	202	17	36	883
Appropriation					
Expenditures					

[1] Includes all rivers and harbors, flood control, and multiple-purpose construction and maintenance.
[2] Expenditures include use of TVA corporate funds where applicable.
[3] Includes all funds for Bonneville Power Administration, Southeastern Power Administration, and Southwestern Power Administration.
[4] Appropriations recommended by President Truman for fiscal year 1954.
[5] Appropriations recommended by President Eisenhower for fiscal year 1954.

Sources: (1) The Budget of the United States, 1949–59; (2) Annual Report of the Tennessee Valley Authority, 1949–57; (3) H. Rept. 314, 83d Cong., 1st sess.; (4) H. Rept. 450, 83d Cong., 1st sess.

TABLE II.—*Summary table, Budget Bureau requests, appropriations and expenditures for Federal development of water resources, fiscal years 1949–59*

[Millions of dollars]

	Budget Bureau request	Appropriation	Expenditure
1949	994	958	891
1950	1,246	1,131	1,026
1951	1,511	1,173	1,075
1952	1,195	1,167	1,125
1953	1,321	1,185	1,200
1954 (Truman)	1,227		
1954 (Eisenhower)	864	806	1,054
1955	785	757	929
1956	742	847	804
1957	813	878	918
1958	913	893	[1] 1,182
1959	883		

[1] Estimated.

Sources: Same as table I, supra.

TABLE III.—*Comparative magnitudes of certain features of the Colorado River storage project and the Missouri Basin project*

	Colorado River storage project	Missouri Basin project
Authorization	Act of Apr. 11, 1956, Public Law 485, 84th Cong.	Flood Control Act of 1944, 58 Stat. 884.
Total estimated cost	$1,000,000,000	$5,500,000,000.
Hydroelectric capacity	1,228,000 kilowatts	$2,482,000 kilowatts.
Acres irrigated	132,380 (full), 232,130 (supplemental).	3,330,120 (full), 702,203 (supplemental).

Source: United States Bureau of Reclamation.

TABLE IV.—*Electrification loans comparison of budget estimates with funds authorized, fiscal years, 1949–57*

Year	Budget request		Congress authorized	
	Regular	Reserve	Regular	Reserve
1949	$300,000,000		$400,000,000	
1950	350,000,000		350,000,000	$150,000,000
1951	400,000,000		[1] 264,500,000	[2] 39,182,305
1952	100,000,000		100,000,000	75,000,000
1953	50,000,000	$50,000,000	50,000,000	50,000,000
Subtotal	1,200,000,000	50,000,000	1,164,500,000	314,182,305
1954 [3]	135,000,000	60,000,000	135,000,000	45,000,000
1954 [4]	95,000,000	60,000,000		
1955	55,000,000	35,000,000	135,000,000	35,000,000
1956	160,000,000	35,000,000	160,000,000	100,000,000
1957	145,300,000	25,000,000	[5] 214,000,000	
1957, supplemental request (Mar. 12, 1957)	200,000,000		[6] 414,000,000	
1958	179,000,000		[7] 179,000,000	
Subtotal	[8] 834,300,000	[8] 155,000,000	[9] 1,023,000,000	180,000,000

[1] Congress authorized a new loan authorization of $350,000,000. However, the appropriation act included a provision requiring that reductions be made in the various appropriations and loan authorizations included in the act. Under subsequent legislation the authorization for electrification loans was reduced to $264,500,000.

[2] Congress authorized a reserve authorization of $150,000,000 which was to include the uncommitted balance of reserve authorization available as a carryover from the fiscal year 1950. The carryover into 1951 of $139,957,974 included an uncommitted balance from the 1950 reserve authorization of $110,817,695.

[3] Truman estimate.

[4] Eisenhower estimate.

[5] Congress provided a new loan authorization of $214,000,000 with a provision that not to exceed $25,000,000 be placed in reserve until needed, June 4, 1956.

[6] Regular authorization of $214,000,000 provided in Public Law 554 dated June 4, 1956. Supplemental authorization of $200,000,000 provided in Public Law 85-15 dated Apr. 16, 1957.

[7] Congress provided a new loan authorization of $179,000,000 with a provision that not to exceed $20,000,000 be placed in reserve until needed.

[8] 1954—includes Eisenhower requests only.

[9] 1957—$214,000,000 authorized June 4, 1956, included in the $414,000,000, so not reflected in subtotal.

Source: Rural Electrification Administration.

(The following tables (I–XI) were presented for insertion in the record by Maj. Gen. E. C. Itschner, Chief of Engineers:)

TABLE I.—*Comparison of magnitude of construction work on selected United States and U. S. S. R. dams* [1]

Name of dam	Installed capacity (kilowatts)	Amount of construction work (cubic yards)		
		Excavation	Fill	Reinforced concrete
Kuybyshev, U. S. S. R.	2,100,000	101,000,000	103,500,000	10,330,000
Grand Coulee, United States	1,944,000	10,350,000		10,440,000
Bratsk, U. S. S. R.	3,840,000	7,560,000	21,670,000	9,560,000

[1] From Gidrotekhnicheskoye Stroitel'stvo, No. 11, 1957 (hydroengineering construction).

TABLE II.—*Comparison of United States and U. S. S. R. major hydroelectric powerplants and dams*

Country	Name	River	Powerplant		Reservoir		Dam			Status [1]
			Capacity (kilowatts)	Turbines (number)	Capacity (acre-feet)	Length (miles)	Type	Length (feet)	Maximum height (feet)	
United States	Grand Coulee Dam	Columbia	1,944,000	18	9,402,000	151	Concrete, gravity	4,173	555	Completed 1942.
	Hoover Dam	Colorado	1,249,800 [1] 1,354,300	18	29,827,000	115	Concrete, arch	1,244	726	Completed 1936.
U. S. S. R.	Krasnoyarsk Dam	Yenisey	4,004,000	14	85,790,000	250	Concrete, probably gravity	2,300	400	Under construction.
	Bratsk Dam	Angara	3,840,000	18	145,100,000	340	Concrete, gravity	[2] 2,000	444	Do.
	Stalingrad Dam	Volga	2,300,000	22	89,200,000	370	Earth with concrete spillway; gravity.	16,400	120	Do.
	Kuybyshev Dam	Volga	2,100,000	20	42,400,000	370	do	19,140	100	Completed 1957.
		Kama				185				

[1] Future planned expansion.

[2] Combined with earth fill, over 3 miles long.

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TABLE III.—*Hydroelectric powerplants in U. S. S. R. with more than 10,000-kilowatt capacity*

CATEGORY I: 1,000,000 KILOWATTS OR MORE INSTALLED CAPACITY

Name of powerplant	River	Status	Installed capacity (kilowatts)
LOWER VOLGA AREA			
1. Kuybyshevskaya GES	Volga	Almost complete	2,100,000.
2. Nizhne-Volzhskaya GES	do	Preliminary plan	Not available.
3. Saratovskaya GES	do	Under construction	1,000,000.
4. Stalingradskaya GES	do	do	2,300,000.
KIROV AREA			
5. Nizhne-Kamskaya GES	Kama	Planned	1,400,000.
CENTRAL SIBERIAN AREA			
6. Boguchanskaya GES	Angara	do	3,000,000.
7. Bratskaya GES	do	Under construction	3,840,000.
8. Krasnoyarskaya GES	Yenisey	do	4,004,000.
9. Nizhne-Angarskaya GES	Angara	Preliminary plan	Not available.
10. Ust'-Ilimskaya GES	do	Under survey	3,000,000.
11. Yeniseyskaya GES	Yenisey	Site selected	6,000,000.
AMUR/CHINA AREA			
12. Blagoveshchenskaya GES	Amur	Planned	Not available.
13. Dzhalindskaya GES	do	Under construction	1,000,000.
14. Khinganskaya GES	do	Planned	1,000,000.
15. Kuznetskovskaya GES	do	do	1,000,000.
16. Poyarkovskaya GES	do	do	Not available.
17. Sukhotinskaya GES	do	do	1,000,000.
18. Zeyskaya GES	Zeya	do	1,000,000.
19. Nizhne-Obskaya GES	Ob	Under consideration	Over 2,000,000.
20. Nizhne-Yeniseyskaya GES	Yenisey	Planned	Do.
21. Osinovskaya GES	do	do	Do.

CATEGORY II: 200,000 TO 1,000,000 KILOWATTS INSTALLED CAPACITY

22. Gor'kovskaya GES	Volga	Completed	400,000.
23. Shcherbakovskaya GES	Volga and Rybinsk Reservoir	do	330,000.
UKRAINE AREA			
24. Dnepro GES	Dnieper	do	650,575.

25. Dneprodzerzhinskaya GES	do	Under construction	250,000 or 312,000.
26. Kakhovskaya GES	do	Completed	312,000.
27. Kanevskaya GES	do	Planned	250,000.
28. Kremenchugskaya GES	do	Under construction	450,000.
TRANSCAUCASUS AREA			
29. Dar'yal'skaya GES	Terek	do	220,000.
30. Gyumushskaya GES	Razdan	Completed	214,000 (224,000).
31. Mingechaurskaya GES	Kura	do	300,000.
32. Yer GES	Razdan	Planned	224,000(?).
LOWER VOLGA AREA			
33. Cheboksarskaya GES	Volga	Under construction	800,000.
URALS AREA			
34. Kam GES	Kama	Completed	540,000.
35. Verkhne-Kamskaya GES	do	Planned	400,000.
KIROV AREA			
36. Votkinskaya GES	do	Under construction	540,000.
ALTAY AREA			
37. Belokamenskaya GES	Irtysh	Preliminary plan	250,000.
38. Bobrovskaya GES	do	do	Not available.
39. Bukhtarminskaya GES	do	Under construction	540,000.
40. Semipalatinskaya GES	do	Preliminary plan	200,000.
41. Shul'binskaya GES	do	Under construction	500,000.
42. Ust'-Kamenogorskaya GES	do	Completed	240,000.
KUZBASS AREA			
43. Bogorodskaya GES	Ob	Preliminary plan	Not available.
44. Kamenskaya GES	do	do	500,000.
45. Novosobirskaya GES	do	Almost fully operating	400,000.
46. Omskaya GES	Irtysh	Preliminary plan	Not available.
CENTRAL SIBERIA AREA			
47. Irkutskaya GES	Angara	Partly operating	661,000.
48. Minusinskaya GES	Yenisey	Preliminary plan	Not available.
AMUR/CHINA AREA			
49. Muchikanskaya GES	Argun	Planned	400,000.

TABLE III.—*Hydroelectric powerplants in U. S. S. R. with more than 10,000-kilowatt capacity*—Continued

CATEGORY III: 50,000 TO 200,000 KILOWATTS INSTALLED CAPACITY

Name of powerplant	River	Status	Installed capacity (kilowatts)
MURMANSK AREA			
50. Iovskaya GES	Iova	Construction commenced	80,000.
51. Knyazhegubskaya GES	Kovdo	Completed	128,000.
52. Nivskaya GES–II	Niva	do	60,000.
53. Nivskaya GES–III	do	do	150,000.
LENINGRAD AREA			
54. LGES–6	Volkhov	do	66,000.
55. LGES–9	Svir	do	100,000.
56. LGES–10	Vuoksi	do	96,000.
57. LGES–11	do	do	100,000.
58. Ondskaya GES	Onda	do	80,000.
59. Verkhne-Svirskaya GES	Svir	do	160,000.
BALTIC AREA			
60. Alitusskaya GES	Neman	Planned	Not available.
61. Birshtonskaya GES	do	do	Do.
62. Druskenikskaya GES	do	do	Do.
63. Kaunasskaya GES	do	Under construction	100,000.
64. Kegumskaya GES	Zapadnaya Dvina	Complete	70,000.
65. Mienenskaya GES	do	Planned	Not available.
66. Narvskaya GES	Narva	Complete	144,000.
67. Plyavinskaya GES	Zapadnaya Dvina	Under construction	120,000.
68. Bovetskaya GES	Neman	Planned	Not available.
69. Yekabpilssakaya GES	Zapadnaya Dvina	do	Do.
BELORUSSIYA AREA			
70. Beshemkovichskaya GES	do	do	Do.
71. Dodukovskaya GES	Neman	Preliminary plan	Do.
72. Druvskaya GES	Zapadnaya Dvina	do	Do.
73. Grodnenskaya GES	Neman	do	Do.
74. Mogilevskaya GES	Dneiper	do	Do.
75. Mostovskaya GES	Neman	do	Do.
76. Orshinskaya GES	Dneiper	do	Do.
77. Rechitskaya GES	do	do	Do.
78. Vilyakhovskaya GES	do	do	Do.
79. Vitebskaya GES	Zapadnaya Dvina	Planned	120,000.
80. Zhlobinskaya GES	Dneiper	Preliminary pain	Not available.

MOSCOW AREA			
81. Penzenskaya GES	Sura	Under construction	Do.
82. Uglichskaya GES	Volga	Completed	165,000.
UKRAINE AREA			
83. Kiyevskaya GES	Dneiper	Planned	180,000.
84. Lyubechskaya GES	do	Preliminary plan	Not available.
TRANSCAUCASUS AREA			
85. Arzninskaya GES	Razdan	Under construction	65,000.
86. Atarbekyanskaya GES	do	Completed	64,000.
87. Kanakerskaya GES	do	do	88,000.
88. Khram GES-1	Khrami	do	120,000.
89. Khram GES-2	do	Under construction	100,000.
90. Ladzhanurskaya GES	Ladzhanuri	do	144,000.
91. Tatevskaya GES	Bargashut	Planned	100,000.
LOWER VOLGA AREA			
92. Tsimlyanskaya GES	Don	Completed	160,000.
URALS AREA			
93. Pavlovskaya GES	Ufa	Under construction	115,000.
UZBEK-KAZAKH AREA			
94. Farkhadskaya GES	Syr Darya	Completed	120,000.
95. Kairak-Kumskaya GES	do	do	120,000.
96. Komsomol'skaya GES	Chirchik Canal	do	86,000.
97. Shaarikhanskaya GES-2	Shaarikhan-Say	Planned	52,000.
98. Tavaksayskaya GES	Chirchik Canal	Completed	74,000.
ALTAY AREA			
99. Arzharskaya GES	Irtysh	Preliminary plan	90,000.
100. Donskaya GES	do	do	110,000.
101. Izvestkovskaya GES	do	do	110,000.
102. Pavlodarskaya GES	do	do	100,000.
103. Podpushkovskaya GES	do	do	100,000.
104. Ust'-Narymskaya GES	Nazym	Planned	Not available.
105. Yamshevskaya GES	Irtysh	Preliminary plan	120,000.

TABLE III.—*Hydroelectric powerplants in U. S. S. R. with more than 10,000-kilowatt capacity*—Continued

CATEGORY III: 50,000 TO 200,000 KILOWATTS INSTALLED CAPACITY—Continued

Name of powerplant	River	Status	Installed capacity (kilowatts)
CENTRAL SIBERIAN AREA			
106. Salyanskaya GES	Yenisey	do	Not available.
107. Sukhovskaya GES	Angara	do	Do.
108. Tel'minskaya GES	do	do	Do.
FAR NORTH AREA			
109. Mamakanskaya GES	Mamakan	Under construction	66,000.

CATEGORY IV: 10,000 TO 50,000 KILOWATTS INSTALLED CAPACITY, WITH A FEW UNDER 10,000 KILOWATTS CLOSELY ASSOCIATED TOGETHER OR WITH OTHER HIGHER CAPACITY POWERPLANTS

MURMANSK AREA			
110. Borisoglebskaya GES	Pats-Yoki	Preliminary plan	45,000.
111. Kaittakoshaya GES	do	Construction may have commenced	12,000.
112. Khevoskoskaya GES	do	Planned	17,000.
113. Kumskaya GES	Kovdo	Under construction	Not available.
114. Matkozhnenskaya GES	Vyg	Completed	Do.
115. Nivskaya GES–I	Niva	do	30,000.
116. Purnukovskaya GES	Pats-Yoki	Preliminary plan	18,000.
117. Rayakoskaya GES	do	Completed	40,800.
118. Tulomskaya GES	Tuloma	do	48,000.
119. Vygostrovskaya GES	Vyg	Planned	Not available.
120. Yaniskovskaya GES	Pats-Yoki	Completed	28,000.
LENINGRAD AREA			
121. Kondopozhskaya GES	Suna	do	33,000.
122. Pal'yesandal'skaya GES	Foot of Lake Pal'ye	Planned	Not available.
BALTIC AREA			
123. Pravdinskaya GES	Pregolya (Alle)	Completed	12,000.
MOSCOW AREA			
124. Dorogobuzhskaya	Dneiper	Under construction	Not available.
125. Ivan'kovskaya GES	Volga	Completed	30,000.

126. Kalininskaya GES	do	Preliminary plan	Not available.
127. Kaluzhskaya GES	Oka	do	Do.
128. Orlovskaya GES	Orel	do	Do.
129. Rzhevskaya GES	Volga	do	Do.
130. Skhodnenskaya GES	Skhodnya	Completed	30,000.
131. Staritskaya GES	Volga	Preliminary plan	Not available.
UKRAINE AREA			
132. Dubossarskaya GES	Dnestr	Completed	40,000.
133. Kamenkovskaya GES	do	Planned	Not available.
134. Krasno-Oskol'skaya GES	Oskol	Under construction	Do.
135. Molochnaya GES	Molochnaya	Preliminary planning (1951)	10,000.
136. Snyatynskaya GES	Prut	Under construction	Not available.
137. Zakarpatskaya GES	Tereblya and Rika	Completed	18,000.
TRANCAUCASUS AREA			
138. AbGES	Abasha	do	Under 10,000.
139. Alaverdinskaya GES	Debet	do	Do.
140. Artavandskaya GES	Canal off Razdan	Planned	Not available.
141. Bagnarskaya GES	Nakaduli	Completed	14,000 to 16,000.
142. Chitakhevskaya GES	Kura	do	18,000.
143. Dzora GES	Debet	do	22,500.
144. Gumatskaya GES–1	Rioni Valley	Partly operating	Not available.
145. Gumatskaya GES–2	do	Under construction	Do.
146. Leninakanskaya GES	Arpa-Chai	Completed	Under 10,000.
147. Makharadskaya GES (Bzuzhskaya)	Bzuzha	Partly operating	Not available.
148. Martkobinskaya GES	Samgori Canal	Completed	10,000.
149. Nogavitskaya GES	Razdan	Planned	Not available.
150. Novaya GES	Kura	do	Do.
151. Ortachel'skaya GES	do	Completed	20,000.
152. Ozernaya GES	Razdan	do	34,000.
153. Rionskaya GES–1	Rion	do	48,000.
154. Satskhenskaya GES	Samgori Canal	do	10,000.
155. Shaori GES	Didi Chala	do	14,000 to 16,000.
156. Sukhum GES	Zap. Gumista	do	25,000.
157. Tetriskhevinskaya GES	Samgori Canal	do	10,000.
158. Tkibul'skaya GES	Tikbuli	Partly operating	Not available.
159. Varvarinskaya GES	Kura	Completed	17,000 (19,500).
160. Vorodinskiy Kaskad	Vorotan	9 plants planned	Not available.
161. Yer GES–1	Razdan	Completed	33,000.
162. Yer GES–2	do	do	3,000.
163. Za GES	Kura	do	36,800.
164. Zurnabadskaya GES	Gyandzha	do	Under 10,000.
NORTH CAUCASUS AREA			
165. Baksan GES	Baksan	do	25,000.
166. Belorechenskaya GES	Belaya	Partly operating	Not available.
167. Chirkeyskaya GES	Sulak	Under construction	Do.
168. Chir-Yurtovskaya GES	do	do	Do.
169. Dakhovskaya GES	Belaya	do	Do.
170. Ezmin GES	Terek	Partly operating	Do.

TABLE III.—*Hydroelectric powerplants in U. S. S. R. with more than 10,000-kilowatt capacity*—Continued

CATEGORY IV: 10,000 TO 50,000 KILOWATTS INSTALLED CAPACITY, WITH A FEW UNDER 10,000 KILOWATTS CLOSELY ASSOCIATED TOGETHER OR WITH OTHER HIGHER CAPACITY POWERPLANTS—Continued

Name of powerplant	River	Status	Installed capacity (kilowatts)
NORTH CAUCASUS AREA—continued			
171. Gergebil'skaya GES	Kara-Koyau	Completed	8,000.
172. Gizel'donskaya GES	Gizel'don	do	22,500.
173. Krasnaya Polyanskaya GES	Mzmta	do	28,000.
174. Ordzhonikidzevskaya GES	Terek	do	7,500.
175. Sengilevskaya GES	Nevinnomysk Canal	do	25,000.
176. Verkhnaya Achalugskaya GES	Alkhanchurt Canal	do	15,000.
177. Yegorlykskaya GES	Yegorlyk	Under construction	Not available.
178. Iriklinskaya GES	Ural	Completed	10,000 to 50,000.
179. Ponyshskaya GES	Chusovaya	do	10,000.
180. Salavatskaya GES	Belaya	Under construction	Not available.
181. Shirokovskaya GES	Kosva	Completed	28,000.
182. Verkhoturinskaya GES	Tura	do	11,000.
183. Zmeyegorskaya GES	Yuryuzan	do	14,000.
KIROV AREA			
184. Votkinskaya GES	Voshka	do	15,000.
KARAGANDA AREA			
185. Dzhezkazganskaya GES	Kara Kingor	do	25,000 to 30,000.
UZBEK-KAZAKH AREA			
186. Ak Kavakskaya GES-1	Chirchik Canal	do	15,000.
187. Ak Kavakskaya GES-2	do	do	15,000.
188. Ak-Tere GES	Boz-Su Canal	do	15,000.
189. Bozsuyskaya GES-1	do	do	4,400.
190. Burdzharskaya GES	Ankhar Canal	do	6,600.
191. Charvakhskaya GES	Chirchik	Planned	Not available.
192. Golodnostepnaya GES	Syr-Dar'ya	do	40,000.
193. Kadyr'yinskaya GES	Boz-Su Canal	Completed	13,000.
194. Khisharauskaya GES	Not available	Partly operating	15,000 or more.
195. Kokandskaya GES	Sokh	Under construction	Not available.
196. Kuvasayskaya GES	Not available	Completed	10,000.
197. Nizhne-Bozsuskaya GES-1	Boz-Su Canal	do	10,000.
198. Nizhne-Bozsuskaya GES-2	do	do	16,000.
199. Nizhne,Bozsuskaya GES-3	do	do	16,000.

200. Nizhne-Bozsuskaya GES-4	....do	Probably completed	Not available.
201. Nizhne-Bozsuskaya GES-5	....do	Probably exists	Do.
202. Nizhne-Bozsuskaya GES-6	....do	Probably completed	Do.
203. Shaarikhanskyye GES-6 and 7	Shaarikhan-Say	Completed	19,000.
204. Sokhskaya GES	Sokh	Probably completed	25,000 to 50,000.
205. Takhia-Tashskaya GES	Not available	Under construction	24,000.
206. Taligulyanskaya GES-1	....do	Completed	10,000 to 50,000.
TADZHIK AREA			
207. Golovnaya GES	Vaksh	Under construction	Not available.
208. Perepadnaya GES	Vaksh Canal	....do	Do.
209. Pervaya Nizhnyaya Varzobskaya GES	Varzob	Completed	Do.
210. Verkhne-Varzobskaya GES	....do	....do	Do.
211. Vtoraya Nizhnyaya Varzobskaya GES	....do	....do	Do.
ALMA-ATA AREA			
212. Alamedinskiy Kaskad	Alamedin	4 completed, 2 under construction	Do.
213. Almaatinskiy Kaskad	B. Almaatinka (Almatinka)	10 plants; 7 completed, 3 under construction	Largest 18,000; 1 at 4,900, remainder not available.
214. Kopchagayskaya GES	Ili	Under construction	Not available.
ALTAY AREA			
215. Nizhne-Gramaturskaya GES	Gramatur	Completed	13,000.
216. Tishinskaya GES	Ulba	....do	7,500.
217. Ul'binskaya GES	....do	....do	27,600.
KUZBASS AREA			
218. Ishimskaya GES	Ishim	Preliminary plan	Not available.
CENTRAL SIBERIA AREA			
219. Kutlukskaya GES	Irkut (?)	....do	Do.
FAR NORTH AREA			
220. Bystrinskaya GES	Bystraya	Planned	Do.
221. Kyuel'-Sitenenskiy Kaskad	Kyuek' and Siyenya	Planned, 5 powerplants	1st 2 to have 12,000 combined, 3 not available.

TABLE IV.—*Largest hydro projects in the United States*

Construction and operating agency	Rated capacity in megawatts		Project
	Initial	Ultimate	
1. New York State Power Authority	2,190	----------	Niagara, Niagara River.
2. Bureau of Reclamation	1,944	----------	Grand Coulee, Columbia River.
3. Bureau of Reclamation	1,245	1,350	Hoover, Colorado River.
4. Corps of Engineers	1,200	2,000	John Day, Columbia River.
5. Corps of Engineers	1,119	1,743	The Dalles, Columbia River.
6. Corps of Engineers	1,024	1,728	Chief Joseph, Columbia River.
7. Corps of Engineers	980	----------	McNary, Columbia River.
8. New York State Power Authority	940	----------	St. Lawrence, St. Lawrence River.
9. Bureau of Reclamation	900	----------	Glen Canyon, Colorado River.
10. Chelan County Public Utility District (Washington).	711.5	----------	Rocky Reach, Columbia River.
11. Grant County Public Utility District	600	----------	Priest Rapids, Columbia River.
12. Corps of Engineers	595	----------	Oahe, Missouri River.
13. Corps of Engineers	518.4	----------	Bonneville, Columbia River.
14. Tennessee Valley Authority	436	----------	Wilson, Tennessee River.
15. Corps of Engineers	400	----------	Garrison, Missouri River.
16. Bureau of Reclamation	375	----------	Shasta, Sacramento River.
17. Idaho Power Co	360	540	Brownlee, Snake River.
18. City of Seattle	360	----------	Ross, Skagit River.
19. Washington Water Power	336	420	Noxon Rapids, Clark Fork River.
20. Corps of Engineers	320	----------	Fort Randall, Missouri River.
21. Bureau of Reclamation	285	----------	Hungry Horse, Flathead River.
22. Corps of Engineers	280	----------	Clark Hill, Savannah River.
23. Corps of Engineers	270	----------	Wolf Creek, Cumberland River.
24. Corps of Engineers	270	----------	Ice Harbor, Snake River.
25. Tennessee Valley Authority	259	----------	Wheeler, Tennessee River.
26. Susquehanna Power Co	252	----------	Conowingo, Susquehanna River.

TABLE V.—*Principal waterway improvements in the U. S. S. R.*

Waterway	Navigability	Improvements	Remarks
Volga River	2,000 miles of main stream (from Astrakhan' to North of Moscow) and 1,000 miles of tributaries have depths over 10 feet.	5 major dams completed, with reservoirs of greatly increased depth extending more than 900 miles. 3 major dams under construction will convert river into chain of reservoirs for entire distance upstream from Stalingrad to Moscow. 1 major dam below Stalingrad and 3 smaller dams above (northwest of) Moscow proposed for full development. 1 major dam completed, 1 under construction and 2 others planned on Kama River, largest tributary extending into Urals. Intensive dredging maintains 10-foot depth in 100 mile reach through delta below Astrakhan' into Caspian Sea.	Linked to Moscow by 75-mile Moscow-Volga Canal, which has locks capable of handling largest river craft. Access to Black Sea provided by Volga-Don Canal, with modern locks capable of handling most large river craft. Access to Baltic and White Seas is provided by antiquated canal systems capable of handling only small craft. Reconstruction of Volga-Baltic canal system begun.
* * *	4,000 miles of tributaries and upper main stream have depths from 3 to 10 feet.	Several old dams with locks increase depths on Moskva and upper Oka Rivers.	Most tributaries are used chiefly for log rafting and floating.
Don River	370 miles of main stream has depths over 10 feet. 700 miles of tributaries and upper main stream have depths of 3–10 feet.	Large dam at Tsimlyanskaya (about midway between Rostov and Stalingrad) forms reservoir extending over 150 miles upstream to Volga-Don Canal. Smaller dam and lock regulates lower Don River to tidewater. 6 small dams and locks maintain depths on tributary Donets River. 2 larger dams with locks impound reservoir extending 50 miles on tributary Manych River.	Hydroelectric plant at this dam furnishes power for pumping needed at Volga-Don Canal. Reservoir will furnish water for irrigation project to south. Dams on Manych River were built during the 1930's as part of project to link Black and Caspian Seas. After World War II, project was abandoned in favor of Volga-Don Canal.
Dnepr River	660 miles of main stream (from mouth to north of Kiev) and 20 miles of adjacent Yuzhniy Bug River (to Nikolayev) have depths over 10 feet.	2 major dams completed (at Kakhovka and Zaporozh'ye), with reservoirs extending over 200 miles. 3 large dams under construction will increase depths over an additional 300 miles of main stream and tributaries.	DneproGES Dam at Zaporozh'ye, built in early 1930's, under largely American direction was first very large power station built by Soviets. Kakhovka Reservoir will serve South Ukraine-North Crimea irrigation project, now under construction.
	1,480 miles of tributaries and upper main stream have depths from 3 to 10 feet.	1 dam under construction and 7 others planned along upper main stream, will convert river into chain of reservoirs with depths over 10 feet for total of more than 1,600 miles.	Linked to Polish Vistula River waterway system by Pripet River and Dnepr-Bug Canal to Brest, on Russo-Polish border. This canal was reconstructed after World War II.
Neman (Memel) River and Pregel River.	500 miles of main stream and adjacent waterways have depths from 3 to 10 feet.	Dam under construction (at Kaunas) will increase depths for 50 miles upstream. 7 other dams on Neman River will increase depths to approximately 10 feet over total of 500 miles.	The Neman and Pregel Rivers are linked by a canal system built before World War II, when the area was in East Prussia. Other canal systems linked the Neman River to the Polish Vistula River system and to the Dnepr River waterways, but these canals are no longer used.
Baltic-White Sea route	640 miles, the entire length of the route, has depths over 10 feet.	2 dams on the Suir'River (between Lake Ladoga and Lake Onega) increase depths over 100 miles of the route.	The 135-mile Stalin Canal forms the northern portion of this route, linking Lake Onega with the White Sea. It is modern, although the locks are constructed of wood, and can handle large river craft.
	500 miles of tributaries, and adjacent canals have depths from 3 to 10 feet.	Canal along southern shore of Lake Ladoga provides protected passage for small river craft, unsuited for wave conditions frequently encountered on lake.	

TABLE V.—*Principal waterway improvements in the U. S. S. R.*—Continued

Waterway	Navigability	Improvements	Remarks
Volga-Baltic route	360 miles, the entire length of the route, has depths of 3 to 10 feet.	Locks in Sheksna River (southern) portion are capable of handling medium-sized river craft. Locks in northern portion (Mariinskiy Canal) can accomodate only small craft.	45-mile Severo-Dvinskiy Canal links Volga-Baltic Route to Northern Dvina River system leading to White Sea at Archangel. This canal has locks slightly larger than those of the Mariinskiy Canal portion of the Volga-Baltic Route.
	50 miles of tributaries	Canals along southern shores of Lake Beloye and Lake Onega offer protected passage for the small river craft usable on the other sections of this route. Construction of 4 large dams is planned, to rebuild this route to handle large river craft throughout its length.	
Northern Dvina River	400 miles of mainstream (from mouth to Kotlas) has depths over 10 feet. 2,700 miles of tributaries and main stream has depths 3 to 10 feet.	45-mile Severo-Dvinskiy Canal provides access to Volga-Baltic route and Volga River system. Its locks can accomodate small river boats.	Linked to adjacent Kuloy River by an old canal probably no longer used.
Mezen' River	25 miles of main stream at mouth has depths over 10 feet. 525 miles of tributaries and upper main stream have depths of 3 to 10 feet.	None	Main stream and tributaries serve largely undeveloped area. Chiefly used for log rafting and floating.
Pechora River	470 miles of main stream (from mouth to Usa River confluence) has depths over 10 feet. 970 miles of tributaries and main stream has depths 3 to 10 feet.	Long-range plans have been proposed for diverting water from upper reaches into Volga River Basin, to compensate for losses from the last-named stream due to increased evaporation from large reservoirs and withdrawals for irrigation.	Serves Vorkuta coal-mining area.
Ob' River	1,700 miles of main stream (from mouth to confluence of Chulym River and from Novosibirsk to Kamen'-na-Obi) has depths over 10 feet.	Large dam above Novosibirsk increases depths for 130 miles upstream. Other major dams planned near mouth and farther above Novosibirsk, will increase depths to over 10 feet along a total of 2,000 miles of the main stream.	Main stream has ample depth and width over most of course below (north of) Novosibirsk, but flows through sparsely settled tayga and tundra regions in this portion. An old canal system which linked the Ob' and Yenisey Rivers is no longer used. Irtysh River serves rapidly developing agricultural region.
	450 miles of tributary Irtysh River (from mouth to Tobol'sk and above Ust'-Kamenogorsk) has depths over 10 feet. 3,930 miles of tributaries and main stream has depths from 3 to 10 feet.	Large dam on Irtysh River at Ust'Kammenogorsk increases depths for 65 miles upstream. Large dam under construction at Ust'-Bukhtarma will increase depths for 350 miles upstream, to Chinese border and beyond. Large dam under construction at Shul'ba will increase depths for 100 miles. 9 other dams are planned on middle reach of river, chiefly for hydroelectric power and for irrigation. These will increase depths over an additional 600 miles, and by eliminating low-water periods, will maintain 10-foot depths over most of the 2,300-mile river.	This dam has one of the world's highest single-lift locks, raising vessels over 130 feet.
Yenisey River			The Yenisey River is the largest in the U. S. S. R. Oceangoing ships can ascend to Igarka, 450 miles from the mouth. An old canal system which linked the Ob' and Yenisey Rivers is no longer used.

	1,330 miles of main stream (from mouth to Angara River confluence) has depths over 10 feet.	Large dam under construction above (south of) Krasnoyarsk will serve giant powerplant and increase depths for 300 to 400 miles upstream. 4 other giant dams and powerplants are planned on the main stream; these would make over 1,800 miles of the main stream navigable for the largest river craft.	Ship lifts instead of locks are planned for installations at the dams now under construction on the Yenisey and Angara Rivers.
	600 miles of tributaries, including Lake Baykal, have depths over 10 feet. 3,500 miles of tributaries and main streams have depths from 3 to 10 feet.	Large dam at Irkutsk on tributary Angara River raises level of Lake Baikal, increasing depths at mouth of Lake's tributary rivers and at outlet into Angara River. This facilitates shipping by large lake steamers previously unable to pass through shallows at river mouths and outlet. North of Irkutsk a large dam is under construction and 5 others are planned on the Angara River. Each would serve a very powerful hydroelectric station, and together would convert the river into a chain of reservoirs which could accommodate the largest river ships.	This dam does not have a lock at present; one is to be constructed when river traffic requires it.
Lena River	790 miles of main stream (from mouth to mouth of Aldan River) has depths over 10 feet.	None	River serves sparsely settled region.
	2,700 miles of upper main stream (from mouth of Aldan to south) and tributaries have depths from 3 to 10 feet.	Dam under construction on tributary Mamakan River, will be minor improvement.	
Amur River	630 miles of main stream (from mouth to Khabarovsk) has depths over 10 feet.	Proposals have been advanced for construction of cut-off canal, bypass the river's delta and provide a shorter route to the ocean.	Navigation improvements are unlikely until regional development and river traffic are more advanced.
	2,700 miles of upper main stream (above Khabarovsk) and tributaries have depths from 3 to 10 feet.	1 dam under construction (west of Dzhalinda) on upper main stream. 5 dams planned on upper main stream. 2 dams planned on tributaries.	6 dams will be on U. S. S. R.-China boundary and associated hydropowerplants will be international.
Amu Darya River and Aral Sea.	1,070 miles of main stream and Aral Sea (from Termez to Nukus and Aral Sea) have depths over 10 feet.	Hydroelectric dams on tributaries exert regulating effect on the main stream, but the river is generally in its natural state.	Importance for navigation has declined since completion of railroad parallel to river. Withdrawals of water for irrigation are increasing.
	180 miles of main stream has depths of 3 to 10 feet.		Shallows at mouth prevent transit of large lake vessel into river.

TABLE VI.—*Total Soviet areas under irrigation for selected years*

Year:	Million acres	Year—Continued	Million acres
1913	9.9	1939	14.8
1928	10.6	1941	15.0
1932	13.8	1956	27.1

TABLE VII.—*Area of irrigated land by surface and ground water*[1] *(Gidrotekhnika I Melioratsiya, No. 9, 1957)*[2]

Republic	Overall area with irrigation nets on—		Jan. 1, 1951			
			Surface water		Ground water	
	Jan. 1, 1956, 1,000 acres	Jan. 1, 1951, 1,000 acres	1,000 acres	Percent	1,000 acres	Percent
R. S. F. S. R.	3,675.4	2,913.33	2,347.33	80.5	566.25	19.5
Ukrainskaya S. R. R.	542.6	369.64	140.60	37.9	229.04	62.1
Caucasus:						
Azerbaydzhanskaya S. S. R.	3,893.1	3,484.83	2,787.02	80.2	692.87	19.8
Gruzinskaya S. S. R.	757.9	708.36	658.32	93.0	50.04	7.1
Armyanskaya S. S. R.	518.4	496.15	403.46	81.5	92.93	18.5
Soviet Central Asia:						
Uzbekskaya S. S. R.	6,933.1	6,199.64	5,854.02	94.5	346.62	5.5
Kazakhskaya S. S. R.	5,109.5	5,094.16	4,566.61	89.6	527.56	10.4
Kirgizskaya S. S. R.	2,816.4	2,495.41	2,409.00	96.6	86.41	3.4
Turkmenskaya S. S. R.	1,746.3	1,731.65	1,588.53	91.7	143.12	8.3
Tadzhikskaya S. S. R.	1,039.8	968.36	909.20	94.0	59.16	6.0
Total for U. S. S. R.	[3] [4] 27,098.7	24,503.79	21,675.36	88.5	2,823.74	11.5

[1] On Jan. 1, 1956, according to data of TsSU (Central Statistical Administration) and for Jan. 1, 1951, approximate data of Glavvadkhoz Ministry of Agricultural Economy, U. S. S. R.
[2] Hydro Engineering and Improvement.
[3] On Jan. 1. 1956, together with "liman" (reclaimed land) irrigation, 30,576,000 acres.
[4] Increase 1951–56 of 2,594,910 acres, or 10.6 percent.

TABLE VIII.—*Some Soviet irrigation projects recently completed or under construction*

SOVIET CENTRAL ASIA

Kzyl-Orda area (on lower Syr-Dar'ya River): With completion of over 1,000 miles of irrigation canals (planned completion date—1956) 4,942,000 acres of new land can be brought under irrigation.

Turkestan area: With completion of Arys'-Turkestan Canal (planned completion date—1958) 288,365 acres of new land can be brought under irrigation.

Tashkent area (Middle Syr-Dar'ya River): In this area work has started on a system of reservoirs and canals to irrigate 735,000 acres by 1960.

Alma-Ata and Frunze area (Ili and Chu Rivers): A dam now under construction on the Ili River, near the town of Ili, will provide water for irrigating 735,000 acres. In addition about 2,500,000 acres of marginal pastureland can be watered. Orto-Tokory Reservoir on the Chu River will provide water for irrigating 245,000 acres.

Samarkand area: The completion of the Iski-Angarskiy Canal (channel completed 1955) makes possible the irrigation of 98,000 acres and the watering of 367,500 acres of pastureland.

Southwest Soviet Central Asia area: The Kara-Kum Canal, now under construction, will extend westward from Amu-Dar'ya River to Barkharden (west of Ashkabad). The first section of this canal to the Murgab River will make possible the irrigation of 416,000 acres.

NORTHERN CAUCASUS

Eastern area: Project has started to divert water from Terek and other rivers to irrigate 5,390,000 acres.

Central area (vicinity of Stravropol'): Project has started to divert water from Kuban area to irrigate 3,675,000 acres.

Western area (vicinity of Krasnodar): Project has started to irrigate 245,000 acres by diverting water from Kuban River. Scheduled to be completed by 1960.

SOUTHERN CAUCASUS

Southeastern area: Minegechaur Reservoir completed 1954. Main irrigation canals now under construction, Verkhne-Karabakhsky Canal completed 1957. Will irrigate 73,500 acres.

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South Ukraine-North Crimea area: Main dam (Kakhovka) completed 1956. Main irrigation canals now under construction. Will make possible irrigation of 8,500,000 acres.

Rostov-Stalingrad area: Main dam (Tsimlyanskaya) completed 1952. Completion of Don Canal, scheduled for completion in 1957 will make possible irrigation of 4,500,000 acres.

TABLE IX.—*Hydroelectric powerplants in Communist China over 5,000 kilowatts*

Name of powerplant	River	River system	Status	Installed capacity (kilowatts)
1. San-men Hsia	Yellow	Yellow	Under construction	1,100,000
2. Liu-chia Hsia	do	do	Planned	1,000,000
3. Hsin-an Chiang	Hsin-an Chiang	Fu-ch'un Chiang (southwest of Hangchow)	Under construction	580,000
4. Ta-feng-man	Sungari	Sungari (Manchuria)	To be expanded	[1] 495,000 [2] 567,000
5. I-li Ho	I-li Ho	Yangtze	Under construction	330,000
6. Huan-jen	Hun Chiang	Yalu (Manchuria)	do	(3)
7. Tzu-p'ing-p'u	Min Chiang	Yangtze	Planned	(3)
8. Ku-t'ien	Ku-t'ien Ch'i	Min Chiang (northwest of Foochow)	Under construction	60,000
9. Shang-yu Chiang	Shang-yu Chiang	Yangtze	do	60,000
10. Shih-tzu-t'an	L'ung-chi Ho	do	Completed	48,000
11. Liu-ch'i Shui	Yang-ts'un Chiang	Chu Chiang (north of Canton)	Under construction	42,000
12. Ching-po-hu	Mu-tan Chiang	Sungari (Manchuria)	Completed	36,000
13. Huang-t'an-k'ou	Fu-ch'un Chiang	Fu-ch'un Chiang (southwest of Hangchow)	Under construction	30,000
14. Kuan-t'ing	Yung-ting Ho	Hai Ho (west of Peiping)	Completed	30,000
15. Hsia-ch'ing-yüan-t'ung	L'ung-chi Ho	Yangtze	do	24,000
16. Mei-shan	Shih Ho	Huai Ho (west of Nanking)	Under construction	24,000
17. Hui-lung-chai	L'ung-chi Ho	Yangtze	do	16,000
18. Fo-tzu-ling	P'i Ho	Huai Ho (west of Nanking)	do	11,000
19. Shang-ch'ing-yuan-t'ung	Lung-chi Ho	Yangtze	Completed	10,500
20. Mo-shi-kou	Recently cut canal	Hai Ho (west of Peiping)	do	6,000
21. Shih-lung-pa	T'ang-lang Ch'uan	Yangtze	do	5,920
22. Tung-fang	Chang-chiang Ho	Chang-chiang Ho (on Hainan)	do	5,600

[1] Present. [2] Future. [3] Over 250,000.

TABLE X.—*Status of waterway development in Communist China*

Waterway	Navigability	Improvements	Remarks
Yellow River system.....	1,800 miles along main stream with depths of 3–40 feet.	82,200,000 cubic meters of earth were used in increasing height and thickness of dikes. 1,740,000 cubic meters of rocks and bricks used to reinforce banks in lower section. A 1,500-meter long spillway accommodates 5,400 cubic meters of water per second, for diverting water into a flood-detention basin. Another spillway takes care of 1,000 cubic meters per second. A canal diverts water from the Yellow River at a rate of 50 cubic meters per second to the Wei River, 52-km. long with a network of subcanals and ditches with a total length of 5,700-km., 1,500 sluice gates, water locks, gates, culverts, etc. This involved 16,000,000 cubic meters of earthwork. A dam in Inner Mongolia controls 140 cubic meters of water per second in the upper course of the Yellow River. When completed, ships of 500 tons can reach Lan-chou, 3,600 km. inland. Planned also is a canal from Ching-chou on the Yellow River to Tan-chiang-k'ou on the upper Han River, linking the Yellow River with the Han River and the Yangtze. A dam is currently under construction at San-men Hsia (east of Pao-chi). This dam will be one of the largest in the world. It will raise the water level and open to navigation parts of the river formerly nonnavigable.	The Yellow River is of minor importance as a navigable stream. (From Gulf of Chihli to T'ung-kuan, 670 miles have depths of 3 to 40 feet. From T'ung-kuan to Lan-chou, 1,120 miles, have depths of 3 to 33 feet). River is not navigable for more than 400 miles due to sandbars and rapids. Used to considerable extent for irrigation. The Yellow River is linked to the Yangtze River system via the Grand Canal which provides an additional outlet to the Yellow Sea.
Yangtze River System....	3,400 miles along main stream with depths of 3 to 32 feet.	921 sq. km. detention basin, storing 6,000,000,000 cubic meters built in the middle course of Yangtze. Diking will require 12,000,000 cubic meters of earthwork. A 1,026-meter long flood gate controls the flow into the basin. To date, about 8,289,000 cubic meters of earthwork are completed; 117,000 cubic meters of reinforced concrete; 253,400 cubic meters of stone work; 3,480 tons of steel; 800,000 tons of sand, broken stone, etc. A 27,100,000,000 cubic meter reservoir in upper Yangtze is planned. In Tung-ting lake area 260 k. m. of dikes built, a large dam built, and the Tsu River dredged (moving 23,000,000 cubic feet of earth).	Principal east-west traffic artery. (From Wu-sung to Hankow, 672 miles, have depths of 10 to 32 feet; from Hankow to I-ch'ang, 412 miles, 6 to 15 feet; and from Ich'ang to I-pin, 633 miles, 3 to 6 feet). During low water, 3,000-ton vessels, with a 9-foot draft can reach Hankow. Most of the significant river ports of China are located along the lower course of the Yangtze. Shanghai, the largest port for ocean as well as inland waterway traffic is also the main industrial city in China.

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TABLE X.—*Status of waterway development in Communist China*—Continued

Waterway	Navigability	Improvements	Remarks
Hsi Chiang	Total mileage: 248 miles. Limiting drafts 2 to 7 feet at low water; 13 to 16.5 feet at high water.	Dike repair and dredging from 1950 to 1952 involved a total of 26,756,000 cubic meters of earthwork. 90 new dams, sluices and culverts were built during this period. 776,000 cubic meters of sand and earth, 2,126 cubic meters of stone, and 309 cubic meters of reef were removed to improve navigation. An old waterway between Hsing-an and Tajung-chiang in northeastern Kwangsi Province is to be widened and deepened to form a canal connecting up the Hsiang River, The Kuei River and the Pearl River.	The principal waterway of Hunan Province and is linked through the Tung-t'ing Lake to the Yangtze River.
Huai Ho system	Total mileage: 375 miles. Depths range from 7 feet at low water to 13 to 26 feet at high water.	204 km. of canals built on Yi and Shu Rivers; 80 dams, sluice gates, locks and culverts control water on branches of these rivers. On the Huai a giant sluice controls the flow into 8 floodwater-detention basins; total capacity over 7,000,000,000 cubic meters. 2 short canals in lower reaches turn water into Yangtze from Hungtze Hu, which is a large water-detention basin (4,000,000,000 cubic meters capacity). At mouth of Huai, a 170-km. canal 60 to 140 meters wide goes from Hungtze Ho to Yellow Sea. Throughout the Huai system 194 dams, locks, sluices, and culverts were built; 1,561 km. of dikes and embankments were constructed. 77 canals with a total length of 2,969 km. were built or repaired; the projects required about 400,000,000 cubic meters of earthworks.	Navigable by vessels of 30 tons at low water and vessels of 50 tons at high water to Ching-yang-kuan (mile 200). Beyond this point by native craft only.
Hai Ho system	Total mileage: 38 miles. Limiting vessel draft 13 feet at low water; 16 feet at high water.	Reservoir 150 km. northwest of Peiping with an area of 220 sq. km. and a capacity of 2,220,000,000 cubic meters. A 290-meter long earth dam turns a tributary gorge into a reservoir; it includes a tunnel with sluice gates with a capacity of 700 cubic meters per second. Also a large spillway was built for any excess. More than 1,000,000 cubic meters of earthwork, 255,000 cubic meters of stone work and 25,000 cubic meters of concrete were required. Plans have been made for a canal from Tientsin to Peiping to allow passage of vessels of 3,000 tons.	Connects the industrial and commercial center of Tientsin with the sea. The river flows into the Gulf of Chihli at Ta-ku which is the ocean port for Tientsin.
Liao Ho	Total mileage: 14 miles; 15-foot vessel draft limit.	Dam across Hun Ho east of Fushun where river emerges from mountains. 778,000 cubic meters of earth; 1,800,000,000 cubic meter capacity. Includes 850-meter spillway and 556-meter diversion tunnel. Removal of 7,700,000 cubic meters of earth will be required before project is completed. Eventually a canal is to be constructed between San-ch'a-k'ou on the Sungari River and San-chiang-k'ou on the Liao River linking up the Amur, Sungari, and Liao Rivers and Po Hai (Bay).	The only large river in south Manchuria and prior to construction of the railways, was the principal traffic artery of the area. Empties into the Gulf of Liaotung, which is bordered by a concentration of Communist China naval bases, including Port Arthur.

Grand Canal (Yün Ho)	Total mileage: 1 1,100 miles; limiting drafts range from under 4 to 8 feet.	Plans call for expansion and deepening of the existing canal to permit use by large steamers. Dreding at entrance channels.	In north, 1st 400 miles: Limiting draft 0 to 4 feet; next 270 miles: 3 feet; remainder 4.5 to 8 feet. The longest artificial waterway in the world and connects the Yellow and the Yangtze River systems.
Min Chiang system	Total mileage: 129 miles; limiting draft, 8 feet.	Projects planned include dredging, blasting of shoals, and construction of a 10,000 cubic meter breakwater.	The principal route of communication from the China coast to north and west Fukien Province. Serves the densely populated hinterland of Foochow.
Fu-ch'un Chiang system	Total mileage: 222 miles. Limiting draft ranges from under 3 to about 8 feet.	Construction of dikes to prevent flooding and to deepen and narrow navigable channels. Plans to construct a canal from the Fu-ch'un Chiang to the Ch'ang Chiang and thus providing access to the Yangtze River system.	Navigable for vessels drawing 3 feet for 1st 29 miles; by vessels drawing 8 feet for 50 miles and for native craft only on remainder.
Yalu River	Total mileage: 390 miles (see remarks), depths range from 15 to 37 feet.		Small native craft can ascent the river to Ch'ang-pai, approximately 400 miles from the mouth. Through navigation, however, is interrupted by the Sup'ung dam approximately 68 miles upstream. There is a bypass for small vessels.
Sungari River	Total mileage: About 800 miles to Kirin, where through navigation ends. Navigable depths: 5 to 40 feet. Shallow boats navigate the river south of the dam.	Dam about 20 miles south of Kirin forms Sungari Reservoir 210 square miles. Reservoir is used for flood and electric power. Numerous dikes, particularly in area near Harbin.	The most important waterway in Manchuria and carries ⅓ of Manchuria's waterborne commerce. Flows through rich agricultural region for which it serves as outlet. River is of great importance in Manchuria's transportation network, connecting railheads with agricultural areas.

TABLE XI.—*Flood-prevention and irrigation projects in China*

River basins or area	Name	Facility	Details: (P) planned, (U/C) under construction, (Date) completion date
Sinkiang Province	Ho-tien	Reservoir	(P) Irrigated area, 200,000 acres.
	I-kan-ch'i	do	Irrigated area, 50,000 acres. There are many levees, each about 8 kilometers in length. Canal, 16 kilometers.
	A-ku-su	Irrigation	Canal: Length, 130 kilometers; width, 11–19 meters. Irrigated area, 150,000 acres.
	Liu-kou	Reservoir	
	Ta-chuan-kou	do	(Date) Aug. 1, 1955. Capacity of reservoir, 3,?00 cubic meters; irrigated area, 13,000 acres.
	Hung-yen-ch'ih	do	Dam: Length, 200 meters; height, 11 meters. Irrigated area, 30,000 acres.
	Meng-chin	do	(Date) May 4, 1956. Capacity of reservoir, 600,000 cubic meters. Irrigated area, 50,000 acres.
Sungari Basin	Ha-erh-pin	Levee	(U/C) Protected area, 1,800,000 acres.
	Feng-man	Reservoir	Dam: Length, 1,200 meters; height, 91 meters. Capacity of reservoir, 7,500,000,000 cubic meters
Liao Basin	Ta-fuo-fang	do	(U/C) Dam: Length, 1,367 meters; height, 48 meters. Overflow channel: Length, 850 meters; width, 100 meters. Capacity of reservoir, 1,859,000,000 cubic meters.
Hai Basin	Tou-ho	do	(Date) July 17, 1956. Dam: Length of water tunnel, 120 meters. Capacity of reservoir, 200,000,000 cubic meters.
	Pei-ching	Intake canal	(U/C) Completed except construction of tunnel (August 1956). Length of regulator, 243 meters (17 spans).
	Kuan-ting	Reservoir	(Date) June 29, 1953. Height of embankment, 45 meters. Capacity of reservoir, 2,270,000,000 cubic meters. Dam: Length, 209 meters; height, 45 meters. Drainage tunnel: Length, 523 meters; width, 8 meters.
	Tu-liu-chien-ho	Lock	
	Kan-Lu	Reservoir	(P).
Huang Basin	Lower Huang River	Irrigation facilities	
	San-men-hsia	Reservoir	(U/C) Capacity of reservoir, 70,000,000,000 cubic meters. Water level, 360 meters. Dimensions, 3.5 square kilometers.
	Middle of the Yellow River Basin.	do	(U/C).
	Ch'ing-t'ung-hsia	Lock and canal	(U/C) Irrigated area, 300,000 acres.
	Liu-chia-hsia	Reservoir	(U/C) Capacity of reservoir, 4,900,000,000 cubic meters (planned).
	Lung-yang-hsia	do	(P) Length of gorge, over 30 kilometers. Height of side, 500–600 meters.
Tibet	La-sa	Levee	(U/C) Length, 6.5 kilometers. Height, 3 meters.
Yangtze Basin	Tou-Chiang-Yen	Reservoir	(U/C) Hsi-ho and Kuan-ohu locks completed. Irrigated area, 6,000 acres.
	Tung-Liang	do	(P).
	Shih-shih-t'an	do	(Date) August 1956. Capacity of reservoir, 697,000,000 cubic meters.
	San-hsia	do	(P) Scheduled to be largest in world.
	Ching-chiang	Diversion gate	Length of diversion gate, 336 meters.
	Tu-chia-t'ai	Regulator	Length of regulator, 410 meters (30 spans). Height of regulator, 14 meters. Number of spans, 30.
	Han-kou	Breakwater	
	Hua-yang	Reservoir dam	(Date) May 1956. Protected area, 65,000 acres.
	Hung-li Ho	Irrigation aqueduct.	
	Shih-men	Reservoir	(U/C) Capacity of reservoir, 122,600,000 cubic meters. Protected area, 65,000 acres.
	Tan-chiang-kou	Reservoir canal	(P) Capacity of reservoir, 30,000,000,000 cubic meters.
Hua River Basin	Pai-sha	Reservoir	(Date) July 1952. Dam embankment: Length, 1.3 kilometers; height, 46.5 meters. Length of canal, 364 meters. Width of overflow, 100 meters. Capacity, 188,000,000 cubic meters.
	Tzu-la-shan	do	(U/C) Capacity, 230,000,000 cubic meters.

TABLE XI.—*Flood-prevention and irrigation projects in China*—Continued

River basins or area	Name	Facility	Details: (P) planned, (U/C) under construction, (Date) completion date
Hua River Basin	Tsao-lo	Reservoir	(U/C).
	Hsia-tang	do	(U/C) Capacity, 200,000,000 cubic meters.
	Fang-ch'eng	Canal	(P).
	Shih-man-tan	Reservoir	(Date) July 1951. Capacity, 47,000,000 cubic meters.
	Pan-chiao	do	(Date) May 1952. Dam embankment: Length, 1,700 meters; height, 23.55 meters. Overflow: Length, 301 meters; width, 80 meters. Canal: Length, 336 meters. Capacity, 244,000,000 cubic meters.
	Po-shan	do	(Date) May 1954. Dam: Length, 500 meters; height, 43 meters. Power production planned. Capacity, 284,000,000 cubic meters.
	Chu-shan-tien	do	Old name is Ta-p'o-ling. Capacity, 1,500,000,000 cubic meters.
	Nan-wan	do	(Date) November 1955. Dam embankment: Length, 743 meters; height, 34 meters. Power production planned. Capacity, 910,000,000 cubic meters.
	Lung-shan	do	Capacity, 335,000,000 cubic meters.
	Sheng-chia-tien	do	Capacity, 200,000,000 cubic meters.
	N'en-yu-shan	do	
	Mei-shan	do	Dam: Height, 87.19 meters; bridge piers, 15. Power production planned. Capacity, 2,195,000,000 cubic meters.
	Ch'ang-chu-yuan	do	
	Fo-tzu-ling	do	(Date) November 1954. Dam: Length, 500 meters; height, 70 meters. Capacity of reservoir, 500,000,000 cubic meters. Irrigation and power purpose. Capacity, 500,000,000 cubic meters.
	Hsiang-hung-tien	do	(U/C) Power production planned. Capacity, 2,343,000,000 cubic meters.
	Mo-tzu-tan	do	(U/C) Dam: Length, 340 meters; height, 79.5 meters. Power production planned. Capacity, 280,000,000 cubic meters.
	Chin-chien	Regulator	
	Jun-ho-chi	do	
	Hsi-hu	do	
	Cheng-yang-kuan	do	
	T'o-ho	do	
	San-ho West	do	
	San-ho	do	Lock: Length, 700 meters; height, 10 meters; 63 openings.
	Kao-yu	Ship lock	
	T'ai-chou	do	
	Yang-chia-miao	Control lock	
	Kao-liang-chien	Regulator	
	Huai-yin	Ship lock	
	North Chiang-ssu	Irrigation canal	Irrigated area, 4,000,000 acres.
	Pien-tan	Tidal lock	
	She-yang	do	Lock: Length, 4.10 meters; height, 11 meters; 35 openings. Safety area, 2,500,000 acres.
Coastal basins	Sui-ch'i	Drainage pumps	
	Hua-hsien	do	Total number of pumps, over 70,000.
	T'ang-kuang-p'o	Canal	Length, 19.6 kilometers.
	T'ien-pai	Drainage pumps	
	Mu-ti-tung	Reservoir	(P) Irrigated area, 10,000 acres. Height of levee, 24 meters.
	Mo-yang Chiang	Drainage pumps	
	Ch'ing-nan-chia	Reservoir	(P) Irrigated area, 8,000 acres. Capacity, 10,670,000 cubic meters. Full length, 75 kilometers.
	La-han-shan East	do	(P) Dam length, 288 meters. Length of aqueduct, 16 kilometers. Capacity, 4,300,000 cubic meters.
	La-han-shan West	do	(P) Dam length, 212 meters.
	Lu-pao	do	(U/C) Almost complete. Length of regulator, 101 meters. For flood control and irrigation.
	Hsi-nan	Drainage pumps	
	Hsi-nan	Lock	(U/C) Length of lock, 106 meters. For flood control.
	Shui-kou	do	
	San-chiang	do	(U/C) For flood control and tide protection; irrigation project. Flood-free area, 30,000 acres.

TABLE XI.—*Flood-prevention and irrigation projects in China*—Continued

River basins or area	Name	Facility	Details: (P) planned, (U/C) under construction, (Date) completion date
Coastal basins	Fu-Chou River	Dikes and intake locks.	(U/C) Number of gates, 22. Irrigated farmland, 75,000 acres.
	Chu-chiang	Delta	For farming.
	Shih-lung	Reservoir	(U/C) Projected irrigated area, 250 acres of dry rice fields.
	Hua-shu-hsia	do	(Date) June 1956. Dam: Length, 320 meters; height, 21 meters. Irrigated area, 10,000 acres. Capacity, 22,000,000 cubic meters.
	Bias Bay	Coastal levee	
	Huang-shan-tung	Reservoir	Irrigation area, 140,000 acres.
	Wu-k'an-tu	Tidal lock	(Date) 1956. Regulator: Length, 65 meters; 15 spans. Tide protection area, 5,000 acres.
	Ao-chiang	Tidal lock and levee.	(Date) May 1956. Protected rice field, 7,000 acres.
	Chao-an Hsien	Irrigation canal	(Date) March 1956. Irrigation area, 30,000 acres. Total length of canal, 180 kilometers. Number of intakes, 306.
	Cheng-hai Hsien		
	Chieh-yang Hsien		
	Mei Hsien	Irrigation works	(W/C) Completed canal; length 27 kilometers. Under construction: 17 reservoirs, 110 levees, 18 canals.
	Ho-shui	Reservoir	(U/C) Dam height 17.3 meters. Use for flood control, irrigation, and power. Capacity, 53,000,000 cubic meters.
	Ta-fang	do	(U/C) Capacity, 1,000,000 cubic meters.
	T'ing-chi	do	(Date) July 1956. Dam: Height, 37 meters; length, 60 meters. Height of water tower, 27 meters. Irrigation area, 30,000 acres. Capacity, 29,000,000 cubic meters.
	Kuan-ch'iao	Canals	There are 2 canals, each 20 kilometers long.
	Shih-p'i-tou	Reservoir	(U/C).
	Ling-chi and Hou-wu.	do	(Dates) June 1956 and May 1956, respectively. Height of Ling-chi Dam, 31 meters. Capacity of Ling-chi, 18,000,000 cubic meters.
Hsi Chiang	Chin-tien	do	(P) Dam: Length, 100 meters; height, 30 meters. Capacity of reservoir, 40,000,000 cubic meters. Irrigated area, 25,000 acres.
	San-lu	Reservoir canal	(U/C) Length of canal, 172 kilometers. Capacity of reservoir, 14,000,000 cubic meters. Irrigated area, 15,000 acres.
	Huang-li	Reservoir	(U/C) Capacity of reservoir, 2,240,000 cubic meters. Irrigated area, 8,000 acres.
	Ku-i	Reservoirs	(P).

(The following letter and enclosures were submitted by Mr. Gus Norwood, executive secretary, Northwest Public Power Association, and were ordered to be printed by the chairman.)

NORTHWEST PUBLIC POWER ASSOCIATION, INC.,
Vancouver, Wash., February 14, 1958.

Hon. JOSEPH C. O'MAHONEY,
Senate Office Building, Washington, D. C.

DEAR SENATOR O'MAHONEY: It is respectfully requested that this letter be filed as part of the hearing record on Senate Resolution 248.

The Northwest Public Power Association, comprising 103 consumer-owned electric systems in Alaska, Washington, Oregon, Idaho, and Montana which serve almost 2 million people, has long been on record in favor of comprehensive development of natural resources.

In this letter, we specifically urge that the Senate adopt a further resolution calling for the preparation of a long-range, national, investment program for the development of natural resources.

Secondly, we urge consideration by Congress of legislation to authorize a capital budget for these self-liquidating, revenue-producing investments.

Recently, on February 6, 1958, the National Rural Electric Cooperative Association, in a convention with an attendance of 6,642 people at Dallas, Tex.,

adopted 2 resolutions, 1 calling for long-range planning of resources development, and 1 calling for a capital budget. The two resolutions are attached.

The Nation needs an investment program of more than $103 billion in land, water, and forest conservation and development according to the Twentieth Century Fund.

In its monumental report, America's Needs and Resources, by J. Frederic Dewhurst & Associates, 1148 pages, issued in a revised edition in 1955, the Twentieth Century Fund at pages 571 and 572 indicates the need for a 75-year investment program of $20 billion for land reclamation and development, $7.8 billion for forestry, and $80 billion for river-valley development. This gives a total of $107.8 billion less $4.46 billion in duplications for a net long-range investment of $103.34 billion for land, forest, and water conservation and development.

It is a sad commentary that the United States Government does not have a study and analysis of its own comparable in scope to the Dewhurst report.

Recently the State of California published what appears to be the most comprehensive water-resources development plan. The California water plan calls for a $13 billion investment.

My estimate of Columbia River Basin investment potential, within the United States portion only, is from $12 to $15 billion for water-resources development.

The exploratory studies of the President's Water Resources Policy Commission and the President's Material Resources Policy Commission, augmented by the brief study submitted by Mr. Mike Straus, indicate the crying need for a systematic study.

Accordingly, we conclude and recommend that the Senate Committee on Public Works and the Senate Committee on Interior and Insular Affairs submit a resolution to authorize a nationwide survey and inventory of investment needs, looking to the preparation of a long-range financial program for the conservation and development of natural resources.

I am also enclosing the recently codified resolutions of the Northwest Public Power Association which emphasize the hydroelectric aspects of Columbia River multiple-purpose development. This document is entitled, "A Consumer Power Policy."

Respectfully,

GUS NORWOOD, *Executive Secretary.*

Resolutions adopted by the National Rural Electric Cooperative Association, at Dallas, Tex., February 6, 1958:

LONG-RANGE PLANNING OF RESOURCES DEVELOPMENT

Whereas the Nation requires about $100 billion of new investment to properly use our natural resources; and

Whereas the failure to protect and use these resources is resulting in costly floods, loss of valuable topsoil, and the waste of much-needed waterpower; and

Whereas the Federal Government does not have available a long-range investment program for protecting and using its natural resources: now, therefore, be it

Resolved, That we urge Congress to institute a study, looking to the preparation of a long-range investment program for developing our natural resources.

CALLING FOR A CAPITAL BUDGET

Whereas there is no justification in logic or economics for the present Federal accounting and budget system which fails to distinguish between wealth-creating, self-liquidating, capital investments such as in REA loans and hydroelectric power dams, and, on the other hand, the current operating or expense budget; and

Whereas the integrity of a capital budget depends upon a strict definition of capital: now, therefore, be it

Resolved, That we again again strongly urge Congress to enact legislation establishing a capital budget and accounting system; and be it further

Resolved, That we urge the adoption of a strict definition of "capital" to be any revenue-producing asset with a useful life of 5 years or more—a definition which would cover both REA loans and power investment in hydroelectric projects.

A Consumer Power Policy

Revised and adopted November 6, 1957, by the Northwest Public Power Association

Your legislative committee respectfully submits this recodification of Northwest Public Power Association resolutions as taken from the minute books covering 86 business meetings the past 17 years. Some 280 resolutions have been consolidated into a draft about one-tenth the original bulk.

The consumer-owned electric systems of the Pacific Northwest have a public-utility responsibility to serve 2 million people with an abundant supply of electric energy at the lowest possible cost, consistent with sound business practices and with comprehensive development of natural resources. These four goals occur repeatedly in the resolutions. Because they appear as four sides of a unified, consumer-minded policy, we are submitting as a suggested title for this report: "A Consumer Power Policy."

The local consumer power system has been created by the citizens of the community for the express purpose of supplying adequate electric power, when and where it is needed, at the lowest rates consistent with sound business principles.

Being consumer owned, its customers and its stockholders are one and the same, with the result that it has 1 master and 1 loyalty—the community and its citizens.

With no conflict between consumer and stockholder, and with direct control of operating policy by the people it serves, the local consumer-owned power system is in an unequaled position to serve the community.

All Americans, as consumers and citizens—laborers, farmers, housewives, manufacturers, bankers, merchants—have a fundamental interest in the production, distribution, and utilization of the power resources of our Nation. Abundance of low-cost electrical energy or its scarcity and consequent high cost affect the standards of living of all, and the productivity and strength of our Nation itself. It is so vital to all our citizens, to a full-production economy, and the national welfare that the assurance and provision of an abundant supply at lowest possible cost is a public responsibility.

Assurance of an abundant supply requires the prompt and orderly development of our Nation's power resources. Assurance that the American public will receive the undiminished benefit of such develoment requires a positive program of public generation, transmission, and distribution reaching all the way to the public, whenever and wherever necssary.

I. MOTTO OF THE NORTHWEST PUBLIC POWER ASSOCIATION

To provide the best possible electric service at the lowest possible cost consistent with sound business principles.

II. ONE-CENT POWER ACHIEVEMENT AWARD

Resolved, That the membership authorize a utility award for those Pacific Northwest consumer-owner utilities whose average residential rate for any calendar year is 1 cent or less per kilowatt-hour. For calendar year 1956, there were 19 qualifying utilities:

Vera Irrigation District
Salem Electric
Milton-Freewater
Northern Wasco Public Utility District
Tillamook Public Utility District
Grays Harbor Public Utility District
Cowlitz Public Utility District
Grant Public Utility District
Clatskanie Public Utility District
Lakeview L. & P. Co.
Forest Grove
Canby
Monmouth
Tacoma
McMinnville
Drain
Cheney
Grand Coulee
Cascade Locks

III. AWARD FOR ENGINEERING ACHIEVEMENT

To encourage the most efficient operating practices and excellence of engineering in electric generation, transmission, and distribution, and in order to honor the foresight, abilities, and contributions to the ideals of consumer-owned power systems of Mr. McGuire, we hereby establish the Milton Hunt McGuire Engineering Achievement Award.

IV. PURPOSES OF THE NORTHWEST PUBLIC POWER ASSOCIATION

Consumer-owned electric utilities must stand and work together so our operations will be outstanding and successful.

This organization shall assist consumer-owned electric systems of Oregon, Washington, Idaho, Montana, and Alaska to interchange ideas and experience for their mutual benefit.

Article II of the articles of incorporation reads:

"That the purposes for which this corporation is formed are as follows:

"(*a*) To form a nonstock, nonprofit corporation for the purpose of rendering to such consumer owned and operated electric light and power utilities in the States of Idaho, Montana, Oregon, and Washington and the Territory of Alaska as may subscribe, technical, legal, accounting, financial, purchasing, and other service and counsel peculiar to the operation of electric utilities.

"(*b*) To advocate and promote the highest possible efficiency in organization and operative methods of local, consumer-owned electric utilities.

"(*c*) To render assistance and service in the defense of, or the promotion of, any interest common to its members.

"(*d*) To educate its members and the public in the principles and policies of consumer ownership and operation of electric light and power utilities; and to safeguard the principle of home rule.

"This corporation is one which does not contemplate pecuniary gain or profit to the members thereof."

V. CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES

Second only to the development and protection of its human resources, the Nation's foremost task is the conservation of its natural resources. Conservation is the wise use of resources to achieve the greatest good for the largest number of people for the longest time.

All feasible power resources, hydro or other, must be developed as rapidly as they can be soundly undertaken.

River basins should be developed, not only for power production, but in accordance with comprehensive, basinwide plans which will assure optimum soil and forest conservation, flood control, reclamation and irrigation of land, improvement of navigation, municipal and industrial water supply, abatement of pollution, protection of fish and wildlife, expansion of recreational and cultural facilities, salinity and silt control, and other benefits. Such development can be assured only under public control and with the widest practical participation of local public agencies and cooperatives. Outstanding private licenses to exploit the public's hydroelectric power resources should be recaptured as rapidly as possible.

The Federal Power Commission should grant no license to construct a dam if such project would be inconsistent with comprehensive development of the river basin.

We urge a continuing investigation of hydro sites and studies of load growth to insure sound planning of an adequate supply of power. We urge the Corps of Engineers to review its 308 reports every 5 years.

We favor a positive program for the conservation and development of fisheries, wildlife, and recreational resources of the Pacific Northwest and Alaska. We urge Congress to investigate the adequacy and appropriateness of the fisheries research of the United States Fish and Wildlife Service as these relate to water-resources development in the Pacific Northwest.

VI. HIGH HELLS CANYON DAM IS EXCELLENT PROJECT

We endorse the high Hells Canyon Dam as essential to the comprehensive development of the middle reaches of the Snake River on a multiple-purpose basis for flood control, power, navigation, irrigation, recreation, and other purposes, including river control and downstream power benefits. We favor construction by either the Corps of Engineers or the Bureau of Reclamation under legislation patterned after the Hungry Horse Project Act with power to be marketed under the Bonneville Act. We endorse S. 555.

VII. FLOOD CONTROL AND POWER GO HAND IN HAND

Historically the maximum summer flood peak of the Columbia River is 34 times the minimum winter flow. On average 73 percent of the annual runoff occurs in the 6 summer months but only 27 percent of the flow occurs in the 6 winter months when consumers use the most electricity.

The Pacific Northwest urgently needs upstream storage projects such as Hungry Horse Dam to store wasteful summer floodwaters for release in winter when Columbia River flow is lowest and when power need is greatest. Upstream storage thus serves the double purpose of flood control and power.

We urge Congress by law to define and authorize the upstream flood control and power storage objective for the Columbia River so as effectively to cut in half the record 1894 flood of 1,240,000 cubic feet per second at The Dalles to about 600,000 cubic feet per second.

We oppose the diversion of the Columbia River into the Fraser River. Instead we urge Congress to initiate early negotiations between Canada and the United States looking toward the full development of the Columbia River as a unit for the highest benefit of the people of both nations.

VIII. INCREASING THE POWER SUPPLY TO MEET DEMANDS

Federal hydro plants

We endorse the principle of comprehensive development of water resources and support dams which meet this test. We oppose dams which violate this principle. Under this principle the association has endorsed for construction by the Federal Government 39 dams with a capability of about 16 million kilowatts, as follows:

Under construction:
- Ice Harbor
- Yellowtail
- The Dalles
- McNary
- Chief Joseph
- Palisades
- Hills Creek
- John Day
- Cougar
- Fort Peck No. 2

Completed:
- Hungry Horse
- Detroit
- Big Cliff
- Lookout Point
- Dexter
- Chandler
- Albeni Falls
- Canyon Ferry
- Eklutna
- Anderson Ranch
- Roza

Proposed projects:
- Hells Canyon
- Glacier View
- Little Goose
- Lower Granite
- Devils Canyon
- Bruces Eddy
- Penny Cliffs
- Upper Scriver
- Lower Monumental
- American Falls powerhouse
- Libby
- Paradise
- Nez Perce
- Eagle Rock
- Blue Lake
- Lower Scriver
- Green Peter
- Burns Creek
- Swan Lake (in Alaska)

The Middle Snake River area offers the greatest promise for upstream power and flood control storage available in the United States portion of the Columbia River Basin. There is a real need for an adequate study of its ultimate potential uses.

To fill this need we recommend that Congress direct the Corps of Engineers to conduct an immediate and thorough investigation and study of the Middle Snake River and tributaries from below the mouth of the Clearwater River to Weiser, Idaho, and to submit to Congress by December 31, 1959, a report with recommendations for the full, ultimate, comprehensive, multiple-purpose development thereof as part of the full development of the water resources of the Columbia River Basin, including an analysis showing the relationship to fisheries and other conservation values, and that pending action by Congress on this report that no new dams may be built and no new licenses may be granted by the Federal Power Commission in this area.

We endorse in principle the Paradise Dam bill.

Non-Federal hydro plants

We urge Federal support toward expeditious construction of non-Federal public dams, including among others Sultan Dam, Priest Rapids project, Skagit River projects, and the Cowlitz Dams at Mayfield and Mossyrock. We have supported two dams now completed, Box Canyon Dam and redevelopment of Rock Island Dam.

The only dams opposed by the Northwest Public Power Association are the small alternative projects which would conflict with and prevent construction by the Federal Government of the Paradise, Nez Perce, and High Hells Canyon Dams and result in gross underdevelopment of the potential water power thereby violating the principle of comprehensive development. The officers of the association are authorized to intervene before FPC in opposition to such alternative projects.

Federal steam plants

We recognize the authority of the Congress to build fuel-burning generating plants. Under this principle we have endorsed the Fulton steam plant for TVA. We also favor Bonneville Power Administration building 400,000 kilowatts of fuel-burning electric plants.

Federal atomic generating plants

We urge the continued public control by the Government of the United States over atomic energy and we also urge Congress to authorize the construction of Federal atomic electric generating plants.

IX. FEDERAL LAWS ESTABLISH MARKETING PRINCIPLES

The high water mark of Federal hydroelectric legislation is section 5 of the Flood Control Act of 1944 which sets forth four historic principles:

(*a*) To encourage the most widespread use of electric energy.
(*b*) At the lowest possible rates to consumers.
(*c*) Consistent with sound business principles.
(*d*) With preference to public bodies and cooperatives.

X. PREFERENCE CLAUSE FAVORS LOCAL CONTROL

We recognize the so-called "preference and priority" clause of the Federal power statutes as a "home rule clause" which preserves the right of home rule for cooperatives and local units of government. Since the rivers of the Nation belong to the people, it is fitting that the public should have first call on publicly generated electricity. As the owners of the waterpower the general public has the right to the undiminished benefits of the resultant energy at cost and without the imposition of private utility toll charges and monopoly control.

XI. SOUND ENGINEERING LEADS TO SOUND INVESTMENT

A sound Federal power program requires a close coordination of three factors:

(*a*) *Continuing load studies.*—To provide careful estimates of future electrical loads including not only predictable loads, but also contingencies and operating reserves.

(*b*) *Engineering studies.*—To plan the construction of facilities for generating and transmitting power and delivering it at each load center at the proper voltage when needed.

(*c*) *Congressional appropriations.*—To advance capital investment to build facilities to meet energization dates.

If the load studies and the engineering studies are sound, we believe that the appropriations should follow as a matter of course and as a matter of sound business investment.

Greatest economy and most effective use of power supply require interconnection of the various electric powerplants within a region and their connection with the various load centers of the region by means of high voltage transmission lines. These transmission lines are the essential generator to market roads without which limited groups can bottle up a Federal dam and by such monopoly render it a captive dam whose power must be sold at sacrifice prices. The carrying out of the Federal power statutes and in particular the preference or anti-monopoly clause depends primarily upon Federal transmission lines.

XII. FEDERAL TRANSMISSION LINES TO CARRY OUT THE LAW

We urge Congress to construct transmission and substation facilities to integrate Federal power projects to achieve maximum firm power and to transmit such power to the load centers of public bodies and cooperatives at their required voltage.

Specifically we urge the construction of transmission lines from Fort Peck Dam to Yellowtail Dam to Canyon Ferry Dam to Great Falls and Anaconda. We are in favor of a Federal 230,000-volt line to Klamath Falls, the 230,000-volt Kitsap cable, a line from McNary Dam to the High Hells Canyon Dam site and a line through southern Idaho to interconnect with Anderson Ranch Dam, Milner Dam, Minidoka Dam, American Falls Dam, Palisades Dam, and Anaconda.

We oppose the sale of energy from Federal projects at the bus bar. We oppose any legislation to permit marketing of energy by the Federal Power Commission.

We favor the policy of Congress in limiting the marketing authority of Federal agencies to wholesale accounts. Furthermore, we believe that no Federal marketing agency should sell power to private industries within the distribution area of any public body or cooperative unless expressly requested by such public or cooperative body.

We urge Congress to enact legislation and we urge the Federal administrative agencies to permit no power sales or exchange contract nor grant any easement, license or right-of-way over public lands to any electric company unless said company agrees to make available the excess capacity of its transmission system for wheeling to preference customers.

XIII. ELECTRIC POWER AT COST

We favor financing of Federal power facilities on a self-liquidating basis providing for repayment of power investment together with interest over a 50-year period on a modified service life basis.

We oppose any unjustified increases in power rates over those necessary to meet actual costs. Many schemes have been advanced for artificially increasing power rates, including the criteria and ground rules used by various Federal agencies.

We urge Congress to establish uniform criteria for evaluating multiple purpose power projects based on actual anticipated service life of each category of investment as set forth in Bulletin F of the Bureau of Internal Revenue including 150 years service life of dams. Specifically we urge that these criteria be applied uniformly for: (*a*) depreciation, (*b*) accounting, (*c*) benefit-cost ratio, (*d*) allocation of costs, and (*e*) for determining and insuring full river basin development.

We oppose increasing power rates by the levy of additional taxes. We oppose any taxes on interest from electric revenue bonds. We oppose taxation of government at any level by government at any other level. We believe an electric utility is not a proper tax collecting device, particularly for hidden taxes. We likewise oppose the imputation of taxes or the use of "taxes foregone" in evaluating proposed Federal hydroelectric projects. No dam or utility pays taxes, only the consumers pay taxes.

We oppose the proposal that Federal agencies owning downstream dams pay upstream storage charges to private utilities. We urge retention of section 10 (f) of the Federal Power Act as it now stands. We urge FPC to expedite its determination of downstream benefits due in the Columbia River Basin.

We favor a rate of interest at Federal projects equal to the average cost of money to the Government. When national considerations delay a project, the excessive interest during construction should not be included as a cost.

We urge Congress to investigate the Nation's monetary policies and the causes of high interest rates.

The cost allocations at McNary Dam are unreasonable. Navigation has been grossly underevaluated.

We endorse the principles of the Trimble bill as regards cost allocations and other factors in Federal power rates.

We favor amending the Bonneville Act to permit the Administrator to purchase power under contract and under appropriate standards in order to increase firm power supply provided that no steam power should be bought unless it can be merged with hydro and sold without increasing the average system power cost or can be sold on a reimbursable basis.

No power should be sold outside the region without the right of first refusal at the same rate within the region.

We urge Congress to provide for reimbursement of consumer owned electric systems when they must move poles incident to highway construction.

We favor amendment of the Federal Administration Procedure Act to insure the right of public hearings and court review relative to cost allocation and rates.

We adopt the five-page report dated April 11, 1956, of our Wholesale Rate Committee in commenting on the Ford, Bacon, and Davis report on BPA rates.

XIV. SUPPORTING IRRIGATION

We endorse a positive irrigation program in the Pacific Northwest as required by national demand for agricultural produce, provided that when any capital costs of such projects, which are beyond the capacity of the water users to pay, are to be subsidized from power, the following principles and policies should be observed, especially in any proposed legislation for a Columbia Basin account:

(*a*) Irrigation projects shall not be authorized unless each project shows a clear feasibility when direct and indirect benefit and costs are evaluated.

(*b*) In evaluating benefits Congress shall limit the inclusion of indirect benefits up to the point of equaling the direct benefits.

(*c*) The water user shall be required to reimburse the Government for the Federal costs in a ratio not less than the direct benefits bears to the total benefits.

(*d*) The subsidy from power is to be limited to that portion of the irrigation cost which the indirect benefits bears to the total benefits.

(*e*) Any subsidy to irrigation shall not increase power rates during the 50-year period for repayment of power investment. The payment shall be made commencing after the 50th year of project completion.

(*f*) No subsidy shall be assessed against existing projects except as already provided by law.

(*g*) No subsidy shall be allowed for irrigation operation, maintenance, and administrative costs.

(*h*) Power used for irrigation shall be charged at cost.

(*i*) When power users must subsidize irrigation, it is our view that the interest on the related power investment shall be likewise credited toward repaying irrigation investment.

(*j*) We oppose any increase in Grand Coulee power cost for the purpose of subsidizing irrigation projects other than the presently authorized Columbia Basin project.

XV. REGIONAL POWER AGENCY ENDORSED

To open new avenues of agricultural and industrial opportunity and to provide increased employment for an expanding population by accelerating the rate of power development we urge that Congress create a regional public organization to carry forward the Northwest power program on a basis of assuring (1) an adequate power supply, (2) at the lowest possible rates, and (3) consistent with comprehensive development of the waterpower resources of the Pacific Northwest. Specifically we endorse the sixth preliminary draft of the Bonneville Act amendments bill, which provides, in addition to the above, for adoption of the following:

(*a*) Retention of the principles of the Bonneville Act.

(*b*) Adoption of capital budgeting under the Government Corporation Control Act.

(*c*) Adoption of actual service life for projects.

(*d*) Permit the Corporation to use its own revenues.

(*e*) Impose upon the Corporation a public utility responsibility for providing an adequate regional power supply.

(*f*) Establish the Corporation as the marketing agency for power from all Federal dams in Montana, Idaho, Oregon, and Washington.

(*g*) Use interstate compact so the 4 States may take over the Corporation or elect 4 of the 5 directors.

(*h*) Corporation succeed to Bonneville Power Administration.

(*i*) Issuance of revenue bonds.

(*j*) Use of tentative cost allocations.

(*k*) Provision for congressional control over new projects.

Our interest in a regional power agency is of long standing. On the date it was founded, January 31, 1941, the Northwest Public Power Association adopted its first resolution to urge Congress to form a "Federal nonprofit cor-

poration for the wholesale marketing of Columbia River power; that the control of policies and management * * * be vested in a board of directors (of which) a majority * * * shall be appointed by public bodies operating power systems and the balance to be appointed by the Federal Government."

We endorse the Kerr bill for TVA self-financing.

We oppose the present draft of the proposed interstate compact involving the control or allocation of electric power in the Pacific Northwest.

We endorse the Hoover Commission recommendation to transfer navigation and flood-control functions of the Corps of Engineers to the Department of Interior. We further urge that the Department of the Interior be reorganized as the Department of Natural Resources.

XVI. RURAL ELECTRIFICATION SUPPORTED

We urge Congress to make available adequate appropriations for use as capital loan funds to REA borrowers including loans for generation and transmission cooperatives, and adequate funds for administration and for research in power use.

We urge amendment of REA Act to permit a 50-year repayment period when funds are used for longer life projects.

We urge Congress to enact legislation to restore REA to the status of an independent agency.

We oppose the Hoover Commission recommendation to abolish the Rural Electrification Administration and transfer its functions to a Government corporation which would borrow its funds by the sale of long-term bonds. We oppose any attempt to increase the REA interest rate above the present 2 percent level.

We commend the rural electric cooperatives and utility districts of the Pacific Northwest for doing a fine job of rural electrification, serving the people whom the private utilities refused to serve. For these same private monopoly corporations now to turn upon these cooperatives and utility districts and pirate their better consumers is outrageous.

We endorse the right of our cooperatives and districts in serving any and all electric consumers, or potential consumers, in their chosen service area. We deplore the delivery of any Federal power to any private utility for the purpose of pirating consumers from a consumer-owned electric-distribution system.

XVII. REGULATION OF PRIVATE UTILITIES IS TOO LAX

We recognize that private electric companies in performing public utility functions are operating as monopolies under special privileges granted by the various units of government. They are given governmental power to condemn private property, they are granted franchises and certificates of convenience and necessity, and are given the use of highway right-of-way.

We recommend that the Congress order a searching investigation of the electric utility industry in the following respects:

(*a*) To determine the effectiveness of Government regulation.

(*b*) To determine the extent of propaganda, political, and lobbying activity of the private electric companies.

(*c*) To determine the efforts being made by the companies to thwart and discredit consumer-owned electric systems.

(*d*) To determine the extent to which the Public Utility Holding Company Act has been carried out by SEC.

(*e*) To determine the extent to which the industry is meeting its public utility responsibility.

There must be immediately established at every level of private utility operation a thorough and continuing investigation of all expenditures of moneys by power monopolists for propaganda, lobbying, political activity, or corruption of public servants or institutions. Regulatory bodies, law-enforcement agencies, legislatures, and the Congress itself must discharge their duty to the American people to expose, punish, and publicize unethical, immoral, or illegal practices on a vigorous and continuing basis. There must be immediate and continuous action to assure that benefits of tax concessions, accelerated amortization subsidies, and similar windfalls to private companies reach consumers and that inflated valuations, watering, and inefficiency are not charged in expense.

We oppose the merger of private utility corporations in the Pacific Northwest as being contrary to the public interest and as encouraging monopoly. We oppose any amendment of the Public Utility Holding Company Act of 1935 so as

to exempt from regulation such proposed supergenerating corporations as the Pacific Northwest Power Co.

We urge Congress to direct the Federal Power Commission to require accounting adjustments removing from the utility rate base all net plant investment which has been written off under accelerated amortization and liberalized depreciation. We also urge Congress to investigate SEC, FPC, and the Bureau of Internal Revenue in regard to lax accounting and tax administration involving private utilities.

We urge the improvement of corrupt practices laws so as to prohibit the use of rate-payer funds for lobbying, propaganda, political activity, and to influence elections on the part of private electric corporations.

XVIII. DAMS NEEDED FOR NATIONAL DEFENSE

We consider an adequate supply of electric power as a critical element in the national defense. The present nationwide power shortage is indication of military weakness and unpreparedness. In the recent war, the strength of our enemies and of our allies was largely in proportion to their supply of electric energy.

We note that our War Production Board translated large military orders into electric power demand and then ordered the building of defense plants in areas where electric energy either was available or could be made available. The Board regarded power supply as more important than any other production factor except manpower. Under the War Production Board we installed the remaining Bonneville Dam generators and diverted two Shasta Dam generators to Grand Coulee. This was done for increased war production. We believe this Nation, strictly from concern for national defense, should always have a reserve of at least 15 percent above peak loads. We deplore the lack of a natinal military policy providing for adequate power supply.

To correct this deficiency we urge that Congress by law require the Secretary of the Defense, through the National Security Resources Board and in cooperation with other agencies, to conduct continuing surveys of our energy requirements for war production and to make annual reports to the President and Congress with recommendations for meeting such electrical requirements.

XIV. POWER BUSINESS IS PUBLIC BUSINESS

The furnishing of electric energy is the second most important public-utility function of Government, second only to the furnishing of safe domestic water supply.

Consumer-owned power systems have had a profound effect upon this industry, acting as a bridge between the people and their power resources. These systems have served as a yardstick of performance in low rates, good service, rural electrification, responsiveness to the public will, and as advocates of sound conservation of natural resources.

Consumers from all walks of life have a vast stake in an abundance of low-cost electricity.

Suggestions for the improvement of this consumer policy statement should be sent to the Northwest Public Power Association, Vancouver, Wash.

(The following agreement between the United States and the Union of Soviet Socialist Republics was submitted by Mr. Frederick T. Merrill, director, East-West contacts staff, Department of State:)

AGREEMENT BETWEEN THE UNITED STATES OF AMERICA AND THE UNION OF SOVIET SOCIALIST REPUBLICS ON EXCHANGES IN THE CULTURAL, TECHNICAL, AND EDUCATIONAL FIELDS

By agreement between the Governments of the Union of Soviet Socialist Republics and the United States of America, delegations headed on the Soviet side by Ambassador G. N. Zaroubin and on the United States side by Ambassador William S. B. Lacy conducted negotiations in Washington from October 28, 1957, to January 27, 1958, with regard to cultural, technical, and educational exchanges between the U. S. S. R. and the United States. As a result of these negotiations, which have been carried on in a spirit of mutual understanding, the United States and the Soviet Union have agreed to provide for the specific exchanges which are set forth

in the following sections during 1958 and 1959 in the belief that these exchanges will contribute significantly to the betterment of relations between the two countries, thereby contributing to a lessening of international tensions.

SECTION I. GENERAL

(1) The visits and exchanges enumerated in the following sections are not intended to be exclusive of others which may be arranged by the two countries or undertaken by their citizens.

(2) The exchanges provided for in the following sections shall be subject to the Constitution and applicable laws and regulations in force in the respective countries. It is understood that both parties will use their best efforts to have these exchanges effected in accordance with the following sections.

SECTION II. EXCHANGES OF RADIO AND TELEVISION BROADCASTS

(1) Both parties will provide for an exchange of radio and television broadcasts on the subjects of science, technology, industry, agriculture, education, public health, and sports.

(2) Both parties will provide for regular exchanges of radio and television programs, which will include the exchange of transcribed classical, folk, and contemproary musical productions on magnetic tape and records; the exchange of filmed musical, literary, theatrical, and similar television productions.

(3) For the purpose of strengthening mutual understanding and developing friendly relations between the United States and the Union of Soviet Socialist Republics, both parties agree to organize from time to time an exchange of broadcasts devoted to discussion of such international political problems as may be agreed upon between the two parties. The details of the exchanges shall be agreed upon at the working level.

(4) Both parties will provide for an exchange of samples of equipment for sound recording and telecasting and their technical specifications.

(5) Both parties will provide for an exchange of delegations of specialists in 1958 to study the production of radio and television programs, the techniques of sound recording, the equipment of radio and television studios, and the manufacture of films, recording tape, tape recorders, and records.

SECTION III. EXCHANGE OF GROUPS OF SPECIALISTS IN INDUSTRY, AGRICULTURE, AND MEDICINE

(1) Both parties agree to provide for an exchange of delegations in 1958 in the fields of iron and steel, mining (iron ore), and plastics industry. Both parties agree as to the desirability of arranging additional exchanges in industry during 1958–59.

(2) Both sides will provide for the exchange of delegations of specialists in agriculture, the American side receiving during 1958–59 nine delegations of Soviet specialists in the following fields: Mechanization of agriculture, animal husbandry, veterinary science, mixed foods, cotton growing, agricultural construction and electrification, horticulture (including vegetable growing), hydroengineering (irrigation) and reclamation, and forestry, lumbering, and millwork. In 1958–59 the Soviet side will receive nine American delegations of specialists in the following fields: The study of agricultural crops, veterinary science, soil use, and the use of water resources (irrigation and drainage), mechanization of agriculture, agricultural economics (excluding distribution of agricultural products), cotton growing and plant physiology, sheep raising, biological control of agricultural pests, and forestry, lumbering, and millwork.

Details of the exchanges will be agreed upon by representatives of the Embassy of the U. S. S. R. in the United States and of the Department of State of the United States.

(3) Both parties agree to provide for the exchange in 1958–59 of 8 medical delegations of 5 to 6 specialists for periods of 2 to 6 weeks to become familiar with research and achievement in the following fields: New antibiotics, microbiology, physiology, and pharmacology of the nervous system, radiobiology, biochemistry, metabolic diseases, endocrinology, and community and industrial hygiene.

Both parties recognize the desirability of providing for an exchange of delegations in the field of the manufacture of medical apparatus and instruments.

(4) Both parties agree in principle to provide for an exchange in 1958 of delegations of specialists in fisheries.

SECTION IV. VISITS BY REPRESENTATIVES OF CULTURAL CIVIC, YOUTH, AND STUDENT GROUPS

(1) For the purpose of establishing contacts, exchanging experiences, and becoming more familiar with the public and cultural life of both countries, the Soviet side will arrange to invite to the Union of Soviet Socialist Republics during 1958 groups of American writers (5 to 6 persons), composers (5 to 6 persons), painters and sculptors (3 to 4 persons). In 1958, the United States side reciprocally will arrange to invite similar Soviet groups to visit the United States.

(2) Both parties will provide for the exchange in 1958–59 of delegations of representatives of youth and delegations of women in various professions.

(3) Both parties agree to provide for an exchange of delegations of student and youth newspaper editors in 1958–59.

(4) Both parties will promote the development and strengthening of friendly contacts between Soviet and American cities.

SECTION V. EXCHANGE OF VISITS OF DELEGATIONS OF DEPUTIES OF THE SUPREME SOVIET OF THE U. S. S. R. AND MEMBERS OF THE UNITED STATES CONGRESS

The proposal to exchange delegations of deputies of the Supreme Soviet of the U. S. S. R. and Members of the United States Congress will be subject to further discussion between the two parties.

SECTION VI. JOINT CONFERENCES OF U. S. S. R. AND UNITED STATES ORGANIZATIONS

The desirability of agreement to hold joint conferences of interparliamentary groups in 1958 and 1959 or meetings of representatives of the Soviet and United States associations for the United Nations and UNESCO is a matter for the organizations concerned.

SECTION VII. COOPERATION IN THE FIELD OF CINEMATOGRAPHY

Recognizing the importance of developing mutual cooperation between the U. S. S. R. and the United States in the field of motion pictures, both parties have agreed to the following:

(1) To make provisions for the sale and purchase of motion pictures by the film industries of both countries on the principles of equality and on mutually acceptable financial terms. Toward this end, not later than January 1958, Sovexportfilm will enter into contact with representatives of the motion-picture industry in the United States, to be approved by the Department of State of the United States, for the purpose of the sale and purchase of films in 1958.

(2) To arrange for the holding simultaneously in the U. S. S. R. and the United States of film premieres (Soviet films in the United States and United States films in the U. S. S. R., respectively), inviting to these premieres leading personalities of the film industries of both countries.

(3) To carry out in 1958 an exchange of 12 to 15 documentary films in accordance with a list to be mutually agreed upon by the two parties. On the U. S. S. R. side the exchange of documentary films will be carried out by Sovexportfilm, such films to be recorded in the English language, and for the United States by the United States Information Agency, such films to be recorded in the Russian language.

(4) In the second half of 1958 to provide for carrying out for a period of up to 1 month an interchange of delegations of leading motion-picture personalities, scenario writers, and technical personnel to be approved by each side for the purpose of becoming acquainted with experiences in the production of motion pictures in the respective countries.

(5) To recognize the desirability and usefulness of organizing joint production of artistic, popular science and documentary films and of the conducting, not later than May 1958, of concrete negotiations between U. S. S. R. film organizations and United States film companies on this subject, such United States companies to be approved by the Department of State of the United States. The subject matter of the films will be mutually agreed upon by the two parties.

(6) To recommend to the appropriate United States organizations the making of arrangements for the holding of a Soviet Film Week in the United States in 1958 and to recommend to the appropriate motion-picture organizations of the Soviet Union the making of arrangements for the holding of a United States Film Week in the Soviet Union in 1958, and envision the participation in these film weeks of delegations from each side numbering 3 or 4 motion-picture personalities for a period of 2 weeks.

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(7) To recognize the desirability of producing feature films, documentary films and concert films for television or nontheatrical showing in the United States by Soviet motion picture organizations and the producing of similar films by appropriate United States organizations for television or nontheatrical showing in the Soviet Union. Additional concrete negotiations on this question will be carried on between the Soviet Embassy in the United States and the Department of State of the United States.

(8) To designate a standing committee of 4 members, 2 from the Soviet Union and 2 from the United States, the powers of which will be for a period of 1 year and which will meet once in Moscow and once in Washington during that year to examine problems which may arise in connection with the implementation of the provisions of this section. The authority of this committee may be extended by mutual agreement.

SECTION VIII. EXCHANGE OF THEATRICAL, CHORAL AND CHOREOGRAPHIC GROUPS, SYMPHONY ORCHESTRAS AND ARTISTIC PERFORMERS

(1) The Ministry of Culture of the Union of Soviet Socialist Republics will invite the Philadelphia Symphony Orchestra to visit the Soviet Union in May or June 1958 and will send the ballet troupe of the Bolshoi Theatre of the Soviet Union, numbering 110 to 120 persons, to the United States in 1959 for a period of 1 month.

(2) The Ministry of Culture of the Union of Soviet Socialist Republics, on the basis of an existing agreement with Hurok Attractions, Inc., and the Academy of the National Theater and Drama, will send 2 Soviet performers—E. Gilels, pianist; and L. Kogan, violinist—to the United States in January–April 1958, and will invite 2 American soloists—B. Thebom, vocalist, and L. Warren, vocalist—to visit the Soviet Union.

(3) The Ministry of Culture of the Union of Soviet Socialist Republics will send Soviet vocalists I. Petrov, P. Lisitsian, and Z. Dolukhanova, as well as I. Bezrodni, violinist, and V. Ashkenazi, pianist, to the United States and will invite R. Peters, vocalist, L. Stokowski, conductor, and others to visit the Soviet Union.

(4) The Ministry of Culture of the Union of Soviet Socialist Republics, in accordance with an agreement with Hurok Attractions, Inc., will send the State Folk Dance Ensemble of the U. S. S. R. to the United States in April–May 1958 and will consider inviting a leading American theatrical or choreographic group to the Soviet Union in 1959.

(5) The Soviet side will send the Red Banner Song and Dance Ensemble of the Soviet Army or the Choreographic Ensemble "Beriozka" to the United States in the fourth quarter of 1958 and invite one of the leading American choreographic groups to visit the Soviet Union.

SECTION IX. VISITS BY SCIENTISTS

(1) The Academy of Sciences of the Union of Soviet Socialist Republics and the National Academy of Sciences of the United States will, on a reciprocal basis, provide for the exchange of groups or individual scientists and specialists for delivering lectures and holding seminars on various problems of science and technology.

(2) The Academy of Sciences of the Union of Soviet Socialist Republics and the National Academy of Sciences of the United States will, on a reciprocal basis, provide for the exchange of scientific personnel and specialists for the purpose of conducting joint studies and for specialization for a period of up to 1 year.

(3) The details of exchanges mentioned in paragraphs (1) and (2) will be agreed upon directly between the presidents of the Academy of Sciences of the Union of Soviet Socialist Republics and the National Academy of Sciences of the United States in Moscow in the early part of 1958.

(4) The Ministry of Health of the Union of Soviet Socialist Republics will send in 1958 to the United States a group of Soviet medical scientists (3 to 4 persons) for a period of 2 to 3 weeks to deliver lectures and exchange experiences and will receive a similar group of United States medical scientists to deliver lectures and exchange experiences at the Institutes of the Academy of Medical Sciences of the U. S. S. R. and at medical institutes in Moscow, Leningrad, and Kiev.

(5) In 1958 the Ministry of Agriculture of the Union of Soviet Socialist Republics will, on a reciprocal basis, invite United States scientists to visit the U. S. S. R. for the purpose of delivering lectures and exchanging experiences in the fields of biology, selection, pedigreed stockbreeding, agrotechny, mechanization of agriculture, stockbreeding, and others.

SECTION X. EXCHANGE OF UNIVERSITY DELEGATIONS

(1) Both parties will provide for the exchange in 1958 of four delegations of university professors and instructors for a period of 2 to 3 weeks in the fields of natural sciences, engineering education, and liberal arts, and the study of the systems of higher education in the Soviet Union and the United States, each delegation to consist of from 5 to 8 persons.

(2) Both parties will provide for an exchange of delegations of professors and instructors between Moscow and Columbia Universities and Leningrad and Harvard Universities. Further exchanges of delegations of professors and instructors of other universities of the U. S. S. R. and the United States shall be decided upon as appropriate by both parties.

(3) Both parties will provide for an exchange of students between Moscow and Leningrad universities, on the one hand, and United States universities, on the other, amounting to 20 persons on each side for the period of the academic year 1958–59. For the academic year 1959–60 the number will be 30. The composition of the student groups shall be determined by each side.

(4) Both parties will provide for an exchange of delegations of educators (8 to 10 persons) for a period of 30 days in the latter part of 1958.

SECTION XI. EXCHANGE OF INDIVIDUAL ATHLETES AND ATHLETIC TEAMS

Both parties will provide for an exchange of individual athletes and athletic teams, and in 1958–59 will provide for the holding of the following contests in the Union of Soviet Socialist Republics and in the United States:

(1) Basketball games between representative men's and women's teams to be held in the Soviet Union in April 1958.

(2) Basketball games between representative men's and women's teams to be held in the United States in 1959.

(3) Wrestling matches between representative teams to be held in the United States in February 1958.

(4) Wrestling matches between representative teams to be held in the Soviet Union in 1959.

(5) Track and field contests between representative teams to be held in the Soviet Union in July 1958.

(6) Track and field contests between representative teams to be held in the United States in 1959.

(7) Weight-lifting contests between representative teams to be held in the United States in May 1958.

(8) Canadian hockey games between representative teams to be held in the Soviet Union in March–April 1958.

(9) Chess tournaments between representative teams to be held in the United States in 1958.

The details of these exchanges of athletes and athletic teams, as well as financial rarangements for these exchanges, shall be discussed between appropriate Soviet and American sports organizations.

SECTION XII. DEVELOPMENT OF TOURISM

Both parties will promote the development of tourism.

SECTION XIII. EXCHANGE OF EXHIBITS AND PUBLICATIONS

(1) Both sides agree in principle on the usefulness of exhibits as an effective means of developing mutual understanding between the peoples of the Soviet Union and the United States. Toward this end both sides will provide for an exchange of exhibits on the peaceful uses of atomic energy in 1958.

(2) Both parties will promote the further development of exchange of publications and various works in the field of science and technology between scientific institutions and societies and between individual scientists and specialists.

(3) Provisions will be made for the Central Scientific Medical Library of the

Ministry of Health of the Union of Soviet Socialist Republics and corresponding medical libraries in the United States to exchange medical journals.

(4) Both parties will promote the exchange of curriculums, textbooks, and scientific pedagogical literature through the appropriate agencies of higher and secondary education and directly between educational institutions.

(5) The Ministry of Health of the Union of Soviet Socialist Republics will arrange to make available in 1958 from 8 to 10 medical films for presentation in the United States. On a reciprocal basis, the United States will arrange to make available the same number of American medical films for presentation in the Soviet Union.

(6) The Ministry of Agriculture of the Union of Soviet Socialist Republics and the Department of Agriculture of the United States are prepared to exchange in 1958 films on such agricultural subjects as stockbreeding, mechanization of agriculture, construction and utilization of irrigation and drainage systems, protection of plants from pests and blights, and fight against erosion.

(7) The representatives of the Soviet and American sides, having exchanged their views on the problems of distributing the magazines U. S. S. R. in the United States of Amerika in the Soviet Union, have agreed on the desirability and necessity of promoting the distribution of these magazines on the basis of reciprocity. Examination of measures taken by both parties to achieve this end will continue at the ambassadorial level.

SECTION XIV. ESTABLISHMENT OF DIRECT AIR FLIGHTS

Both parties agree in principle to establish on the basis of reciprocity direct air flights between the United States and the Soviet Union. Negotiations on terms and conditions satisfactory to both parties will be conducted by appropriate representatives of each government at a mutually convenient date to be determined later.

JANUARY 27, 1958.

LETTER OF UNDERSTANDING CONCERNING UNITED STATES-U. S. S. R. AGREEMENT ON RADIO-TV EXCHANGES

No. 33–B

Identical letters relating to paragraph (3) of section II of the United States-U. S. S. R. agreement on exchanges were exchanged as follows:

"JANUARY 27, 1958.

"DEAR MR. AMBASSADOR: With respect to paragraph (3) of section II of the agreement signed this date, it is the understanding of both parties to the agreement that the texts of such broadcasts shall be exchanged in advance and discussed at the working level. In the event that either party shall consider that the effect of any such broadcast will not contribute to a betterment of relations between the United States of America and the Union of Soviet Socialist Republics, the exchange of such broadcast shall not takep lace.

"Sincerely yours,

"WILLIAM S. B. LACY
"[GEORGI N. ZAROUBIN].

"His Excellency GEORGI N. ZAROUBIN,
"*Ambassador of the Union of Soviet Socialist Republics.*
"[His Excellency WILLIAM S. B. LACY,
"*Department of State*]."

(The following statements were ordered to be printed by the chairman:)

STATEMENT OF MR. HORACE J. DAVIS, AGRICULTURAL EXPERT ATTACHED TO THE UNITED STATES EMBASSY IN MOSCOW, 1952–57

IRRIGATION FARMING IN THE SOVIET UNION

Background

There are several natural limitations to agricultural production in the Soviet Union. One of these limitations is insufficient rainfall in areas where the soil and other environmental factors generally are suitable for crop and livestock

production. The importance of irrigation as a means of increasing agricultural output was recognized by the Tsarist rulers and from time to time efforts were made to develop irrigation systems in the nonproductive arid regions. It was not until the 1880's, however, that any lasting results in irrigation farming were achieved in that desert area. Over the years, there continued to be some increase in the area under irrigation. Progress has been relatively slow, however, until recent years when the Soviets began placing greater emphasis on the importance of irrigation and have been accelerating the expansion of irrigation facilities faster than in former years.

The principal regions in the Soviet Union, where irrigation farming is practiced on a relatively broad scale, are Central Asia [1] and Kazakh SSR. Available data as of January 1, 1956, shows that of a total of approximately 11.0 million hectares [2] officially reported under irrigation networks in the Soviet Union, more than 7.0 million hectares were in these two regions. There is, however, some irrigation farming in most of the other republics.

Cotton is the principal field crop grown under irrigation. In 1956, for example, the area of cotton under irrigation was more than 2.0 million hectares. Other field crops grown on irrigated fields include rice, sugar beets, alfalfa, tobacco, and some bast fiber and other grain crops. There are, also, relatively large areas of fruit and vegetable crops grown in regions where the water is supplied entirely by irrigation or in regions of marginal rainfall where supplemental irrigation is frequently required.

The importance of irrigation farming in the Soviet Union

A lack of detailed data on irrigation in the Soviet Union and confusion in the terminology used make it difficult to obtain accurate and comparable data. The Soviets usually talk in terms of land area actually irrigated or the land area serviced by irrigation networks. These areas are not identical; the latter is usually larger than the former. On the other hand, the area serviced by irrigation networks apparently does not include estuary irrigation (which is the flooding of lowlands) or the area serviced by overhead irrigation. The use of overhead irrigation has expanded rapidly in the past few years. This method involves the use of tractor-powered spray pumps on an as-needed basis in regions where supplemental irrigation is sometimes required because of inadequate rainfall during the growing season. It is used particularly on vegetable fields in southern regions of the Ukraine and of the RSFSR.

Although the problems resulting from definitions and terminology hamper an appraisal of irrigation developments in the Soviet Union, it is possible to make some comparisons which indicate the rate at which irrigation farming has increased and the planned rate of expansion during the next few years. The area serviced by irrigation networks is used in these comparisons because more data are available on irrigation networks than for other means of measuring these activities. It is believed that any errors inherent to this approach (where the area actually under cultivation is less than the area covered by the network) would be offset largely by additions resulting from estuary irrigation and areas receiving supplemental (overhead) irrigation which are not included in the area serviced by irrigation networks. These comparisons for specified years are shown below.

Year:	*Million hectares with irrigation network*	Year—Continued	*Million hectares with irrigation network*
1913	4.0	1951	9.9
1928	4.3	1956	11.0
1939	6.0	1960 (plan)	13.1

Expressed in relationship to the total area under cultivation, the above data indicate that during the period from 1913 to World War II, between 3 to 4 percent of the land under cultivation was irrigated and that after World War II the area under irrigation was increased to between 5½ and 6½ percent of the total area under cultivation. On a percentage basis, the postwar increase would have been much greater if the Soviets had not increased the total area under cultivation by about 45 million hectares by 1956 over the prewar period.

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[1] Central Asia includes Uzbek SSR. Tadzhik SSR, Turkmen SSR, and Kirghiz SSR.

[2] One hectare equals 2.471 acres. On this basis Russia outstripped the United States of America in total irrigated area in 1956 when the Soviets reported 27,181,000 irrigated acres. The recent current and projected rate of Soviet irrigated area far exceeds that of the United States. Of a total irrigated area of some 27 million acres today in the United States of America federally constructed reclamation facilities can serve 7,658,000 acres.

Plans for expanding irrigation farming

During the sixth 5-year period (1956–60), the Soviets plan to expand the area under irrigation by about 2.1 million hectares. Of this total, 800,000 hectares of the increase will result from improvements in existing irrigation facilities and the remaining 1.3 million hectares will result from newly constructed irrigation facilities.

The following statement from a Soviet publication[3] gives a summary of plans for increasing the area under cultivation during the sixth 5-year period.

"The sixth 5-year plan envisages the expansion of irrigated land, the building of canals and water reservoirs, and the draining of marshland. In the Russian Federation, the Pravo-Yegorliksky, Tersko-Kumsky, Kumo-Manichsky, and Donskoi main canals, the Chograi Reservoir, and the Petrovsko-Anastasyevskaya and Maryano-Cheburgolskaya irrigation systems will be put into operation. In the Ukraine, the Inguletskaya watering and irrigation system and the Simferopol Reservoir will be built. Work will be started on the construction of the North Crimean Canal. Large-scale land reclamation will continue in the marshy Polesie region of Byelorussia. A number of new reservoirs, canals, and irrigation systems will come into being in the arid regions of central Asia. The first section of the Kara-Kum Canal in Turkmenia will start functioning. New forest shelterbelts will rise in droughty regions.

"Millions of acres of new land are to be wrested from deserts, dry steppes, and marshes for farming and stockbreeding."

While the above quotation does not emphasize central Asia, statements from other Soviet sources indicate that most of the increase in the area under irrigation during 1956–60 will be made in central Asia. Smaller increases will take place in Kazakh S. S. R., the R. S. F. S. R., and in other regions. One of the major irrigation projects planned for the sixth 5-year period is in the Hungary steppe region of Uzbek S. S. R. (central Asia) and Kazakh S. S. R. In this area, it is planned to expand the irrigation facilities and bring into cultivation an additional 300,000 hectares of new land, most of which will be planted to cotton. The Soviets estimate that this 1 project will make it possible to increase their production of cotton by about 480,000 to 500,000 bales per year. Water for irrigating the Hungary steppe region will be obtained from the Syr Darya River through a central Hungary steppe canal (now under construction) and a series of small feeder canals which will carry water to all parts of the newly developed farming areas.

Observations by Americans who traveled across the eastern part of the Hungary steppe region indicate that the soil and terrain are about the same as in other regions of Uzbek S. S. R., where cotton is grown successfully under irrigation.

Problems of irrigation farming in the Soviet Union

The principal problems confronting irrigation farming in the Soviet Union have been (1) the development and maintenance of satisfactory irrigation systems which would provide water on an adequate and economic basis, and (2) the high salt content of the subsoil, particularly in central Asia. In regions where the subsoil contains a high concentration of salt, the salt tends to rise to the surface layer of soil after a few years of cultivation and irrigation. For the most part, the Soviets have learned to control this problem through the use of seepage wells, the application of calcium compounds, and by washing the surface soil at several-year intervals. In some areas, however, it has been necessary to abandon some fields because of the salt problem. Also, some fields have been abandoned temporarily because of waterlogging which results from poor irrigation-management practices.

Most of the water-supply lines are open (dirt) ditches with improvised gates for controlling the flow and supply of water. A lack of proper maintenance has frequently created problems of undersupply or oversupply of water and, consequently, has caused crop damage. Here, again, the Soviets have made some improvements in the planning, construction, and operation of the water-supply systems.

Outlook

It is not possible to forecast with any degree of accuracy the future development of irrigation farming in the Soviet Union. In terms of resources (fresh water and land suitable for irrigation), the potentials are very large. There

[3] The Land of Soviets—Soviet Agriculture. Published by the Foreign Language Publishing House, Moscow, 1957.

are large volumes of water in the rivers of central Asia and in the southern parts of the European U. S. S. R. which now flows into the sea. Complete or supplemental irrigation of areas adjacent to these rivers could increase significantly the production of agricultural commodities. However, the irrigation projects now being considered for these regions represent the use of relatively small parts of the resources available. To make full use of the water and land available, it would require many years of work and a larger capital investment than is now contemplated. In the new-lands region of northern Kazakhstan, a lack of water is the principal limitation to larger production of crops and livestock products. Providing irrigation water for this region seems impractical, although the Soviets are considering the construction of irrigation canals through parts of the area, and have even mentioned the possibility of changing the course of some of the rivers as a means of increasing the available supply of irrigation water.

In short, it seems likely that the Soviets will continue to place greater emphasis on irrigation farming in the future than in the past. The increase in the area of land placed under irrigation during the sixth 5-year period (1956–60), however, is not likely to exceed the goal of 2.1 million hectares, but may, in fact, fall short of this objective. On previous irrigation projects, actual achievements have always been far behind the established goals. In 1950, for example, plans were announced to increase the area under irrigation by some 6 million hectares. Soon after the death of Stalin, however, most of these projects, including the construction of the main Turkmen Canal, were either postponed temporarily or abandoned. Recent reports in the Soviet press[4] indicate that progress in increasing the area under irrigation in central Asia (including the new Hungary steppe project) is considerably behind schedule and generally unsatisfactory.

Over a longer period of time, the development of irrigation farming in the Soviet Union will depend largely upon the efforts and the expenditure of resources the Soviets are willing to make to develop this sector of agriculture. They have the necessary prerequisites (water and land), and can greatly expand irrigation farming if it should be decided to utilize the resources necessary for their development.

STATEMENT OF ANGUS MCDONALD, COORDINATOR, LEGISLATIVE SERVICES DIVISION OF THE NATIONAL FARMERS UNION, IN REGARD TO SENATE RESOLUTION 248

Mr. Chairman and members of the committee, we appreciate being permitted to present our views on the subject of the relationship of rivers and related water-resource development programs of the United States, Soviet Russia, and Red China. The comparative development of natural resources, including hydroelectric power, conventional thermal power, nuclear electric power, water transportation, irrigation, and other basic items of production may well determine the outcome of the ideological conflict between the Soviet Union and the United States. Nikita S. Khrushchev, the chief of the Soviet Communist Party, has stated that in the next 15 years Russia will not only catch up with the United States in the production of basic items, but will outstrip it.

I will not recount the facts set forth in a recent excellent and well-documented memorandum published by the Senate Committee on Interior and Insular Affairs and the memorandum authored by the distinguished Senator from Louisiana. A cursory examination of these two publications indicates that the boast of Khrushchev is not an idle one. The Soviet Union, unless comparative trends of resource development are reversed, will outstrip the United States in the next 20 years. It is apparent to all that the Soviets have the natural resources, they have the manpower, and they have the technology. Although the industrial capacity of this Nation at the present time far exceeds that of the Communist countries, it is probable that they will outstrip us, not only in missiles and satellites, but in resource development and especially in development of the resource of atomic energy.

We emphasize resource development in Russia and Red China, not as the main reason for resource development in our own country, but as an additional one. Many years before the Soviet Union appeared on the horizon as a competitor of the United States, the Farmers Union advocated a broad program of resource development, particularly in regard to river basins. We favor the development of all of the resources of every large river basin in the United States on an

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[4] Kazakhstanskaya Pravda and Pravda Vostaka, January 18, 1958.

integrated basis. We feel strongly that soil conservation, flood control, navigation, irrigation, and other multiple purposes are intricately related, and for that reason Farmers Union has adopted resolutions over the years which called for such resource development. I call attention to resolutions pertaining to natural resources adopted at the last biennial convention of the National Farmers Union in Denver, March 23, 1956. These resolutions are as follows:

"USING AMERICA'S NATURAL RESOURCES FOR ALL

"Publicly and privately owned land and resources should be administered in the interest of all the public. To make certain they are, we urge adoption of the following national legislation and policies:

"1. COMPREHENSIVE RIVER VALLEY DEVELOPMENT

"We urge further Federal development of natural geographic areas to promote better use of all existing natural resources of entire river valley basins in order to improve the economic stability of such areas, promote conservation and wise use to prevent erosion and flood. The basins should be organized along completely integrated lines of local control similar to the Tennessee Valley Authority. We also urge that emphasis of such projects continue to be placed on generation of public power, with full respect to preference clauses, irrigation improvements aimed to benefit development of family-type farms, and wisest possible wildlife management.

"Provisions must also be made for continuation and expansion of the small watershed flood prevention and agricultural soil, water, and related resources conservation program both before and after establishment of such valley developments. Such programs of development should include but not be limited to: intensification and expansion of existing conservation programs on both private and public land; reforestation and revegetation to protect watersheds and increase timber and forage; increased appropriations for conservational management and development of all resources; and construction maintenance of timber and stock access roads in national forests. We must make use of all scientific and technological advancements to increase conservation of all natural resources. Necessary action must be taken to halt the destruction and depletion of our land and our forests.

"We strongly recommend the enactment of laws making it mandatory for the executive branch to submit to Congress for prior approval any action it intends to take that would sell or grant proprietary privileges in federally owned land or resources to private interest. Approval to make such transactions would be granted only in those cases where it is clearly shown that the general national welfare will be promoted by alienation of title.

"2. DEVELOPMENT AND REGULATION OF ENERGY AND POWER

"We urge establishment of clear-cut Federal legislation and policies to establish clearly Federal responsibility to produce, regulate, and control public power through programs of area development on the basis of all-inclusive support of a total national program. We urge Federal generation and transmission of the power required to meet the present and future needs of nonprofit electric systems and the use of the withdrawal clause to protect the rights of preference customers. The Federal Government must assist cooperatives and other nonprofit public power agencies to set up generating and transmission facilities where needed by supplying technical and financial support. The Federal Government must construct and operate the high-voltage transmission facilities necessary to integrate individual hydroelectric projects and to deliver appreciable portions of their output to the load centers of preference customers.

"The Federal Government must purchase or generate sufficient thermal energy to supplement the hydroelectric capacity of the Federal system so that the maximum amounts of firm power can be made available for the benefit of preference customers.

"We urge that any electric or other utility, engaged in interstate commerce and enjoying guaranteed profits without risk while operating as a private monopoly with Government protection, be prevented from counting as costs in ratemaking the money spent, either directly or indirectly, to influence political action at any level. We urge amendment of the Internal Revenue Act to preclude charging off such expenditures as those mentioned above as tax deductions. We

recommend legislation requiring that the benefits from accelerated tax amortization be passed on to consumers.

"We urge establishment of regional development agencies to assure proper use of the Federal hydroelectric power and provide for optimum conservation and development of all values of areawide projects such as flood-control navigation, irrigation and recreation. Such development would utilize the highest possible potentials of multipurpose users and benefits including flood control, navigation, recreation, and water for industry, cities, and irrigation.

"We insist that the water rights of farmers be adequately protected. We advocate strict limitations on the discretion of the Federal Power Commission to grant licenses for private development wherever such developments conflict with a multipurpose Federal program. Violation of the Federal preference clauses by the Department of Interior by a policy of deceit and subterfuge which includes refusal to sell Federal power to cooperatives and municipalities must be forestalled. We should remove all limitations on areas served by nonprofit electric utilities.

"We also urge that the technical-assistance program of the Rural Electrification Administration be restored and its borrowing authority expanded.

"We urge Congress to enact legislation prohibiting Federal agencies from turning over any economically feasible Federal power sites to private companies. We also urge the authorization by the Congress of such multipurpose projects including Hells Canyon, Niagara, and Kings River.

"We urge preservation of the excess-lands provisions governing the use of water in Federal irrigation projects in the Federal reclamation law.

"We insist that Congress either authorize the expenditure of funds for the Tennessee Valley Authority, to take care of the growing and critical power shortage in that area, or authorize the sale of bonds by the Tennessee Valley Authority which would provide funds for expansion. We oppose the recommendation of the administration requiring TVA to repay funds greatly in excess of amortization requirements as determined by Congress.

"In regard to allocation of costs of multipurpose projects, we oppose the substitution of the joint costs-remaining-benefits method for the incremental costs method in the southwestern area. We urge the enactment of legislation prohibiting the Department of the Interior from arbitrarily substituting one system of cost allocation for another. We also recommend that the period of amortization be increased from 50 to 100 years.

"3. ATOMIC POWER—THE NEW PUBLIC POWER

"We urge enactment of needed legislation to insure that new sources of atomic energy, which have been developed with taxpayers' money, will be used to benefit all at the lowest possible cost by authorizing the Atomic Energy Commission to push promptly ahead the development and regulation of atomic power in ways that give primary benefit of atomic power to the general public.

"Specifically, we urge Congress to authorize actual use of atomic reactors to boost the electrical energy output of REA cooperatives and other preference customers of public power. And we further recommend that safeguards be set up now that will guarantee maintenance of preference clauses in energy produced by Federal atomic programs, and further safeguards that make it definite that atomic power will not become a private monopoly beyond the reach of Federal control or regulation."

The Eisenhower administration has substituted a partnership between the Federal Government and the private power monopoly for a policy between the Federal Government and the people. This later policy was established over a period of many years by laws passed by the Congress and by administrative decisions. It was also upheld and implemented by court decisions.

The new policy seems always to neglect and ignore the main problem—that is, multiple-purpose development, or comprehensive development as it is sometimes called. It is a policy which sometimes seems to help the big financial interest by substituting partial and piecemeal development for comprehensive development. A recent example was Hells Canyon, which was handed over to the Idaho Power Co., a Maine corporation, by the Eisenhower administration.

It is furthermore a policy of reducing appropriations for multiple-purpose hydroelectric projects already under construction. It is a policy of refusing to assume initiative for construction of any new Federal projects anywhere except by and in the interest of private utilities and to the detriment of the people. Partnership between Wall Street and the Federal Government has been sub-

stituted for comprehensive development in the interest of all the people. It is a partnership under which the United States Government would pay for the nonreimbursable flood-control and navigation features of the project, while the private utility-partner company installs the electric generators and collects the revenue from power sales. The result of applying the Eisenhower partnership in the Northwest has been an economic recession in the Northwest resulting in unemployment and a lack of economic security. It has been a destruction of the once unified plan for comprehensive areawide development of resources.

In the Tennessee Valley, despite promises, Eisenhower has sold out the people by attempting to starve TVA on the one hand by recommending no appropriations, and undermining it on the other with the Dixon-Yates plan which would subvert the purposes of the Tennessee Valley Authority by forcing it to accept delivery of high-cost power from steam plants which would be undewritten by the United States Government but turned over to the private electric power monopoly. Eisenhower has also undermined TVA by replacing a vacancy on the TVA Board of Directors with a man who opposed the philosophy and spirit of the TVA Act.

In the Southwest the Eisenhower administration attempted to destroy the generation and transmission cooperatives and ultimately the distribution cooperatives by destroying the continuing fund, by turning over the power to the private utilities to which multiple purpose and cooperatives, under existing laws, were rightfully entitled. Failing in that because of congressional obstinacy, Eisenhower's assistances reallocated cost in the Southwest in order to jack up existing power rates, and when such cost allocation juggling was threatened by congressional action, under the Kerr bill, Eisenhower vetoed legislation which would prevent hikes in rates. In the Missouri Valley and in other areas throughout the Nation, many attempts were made to deprive the cooperatives and the municipalities of their right under the preference clause and throttle and slowdown existing projects and to prevent the authorization of new ones. This has been the constant policy of the administration for 5 long years.

The seriousness of such a policy has become apparent—unemployment and recession is here, resource development is at a standstill, while our competitors across the waters are going ahead by leaps and bounds. The Eisenhower administration should not be allowed to calmly ignore it. According to these two reports mentioned above there is a wealth of information in the State Department, the Federal Power Commission, and in the files of foreign governments readily accessible to the United States, which indicates that the Communist countries have been going full steam ahead for a number of years. There is also information in our own files in the Department of Interior and other places pertaining to resource development in our own country.

The Army engineers and the Bureau of Reclamation for many years have been making detailed surveys in regard to resource development in our river basins. They also have been making recommendations pertaining to the great need for resource development. The Bureau of Reclamation has a wealth of information in its files which has been ignored by Federal officials for 5 years.

I call attention to A Study of Future Power Transmission for the West, published by the Bureau of Reclamation of the Department of the Interior October 28, 1952. This document is divided into five chapters, titled as follows:

"1. The West's Growing Need for Power;
"2. Sources of Power for the West;
"3. Need for Long-Distance Transportation of Energy;
"4. How Energy May Be Brought From Source to Market;
"5. Concept of a 500,000-Volt System."

Examination of this document seems to indicate that in large part the Soviets have been following the blueprints set forth by the Bureau of Reclamation engineers. The Soviets have been applying the concept of high-voltage economics on page 20 of the Bureau of Reclamation report. I quote from the report on page 20:

"The load-carrying capacity of a transmission line is expressed in kilowatts. A line having twice the voltage of another has four times the kilowatt capacity. The higher voltage lines only costs about twice as much. This means that the cost per kilowatt of the higher voltage is about one-half that of the lower voltage line, as illustrated in figure 11, on page 21."

We in the Farmers Union do not claim to be experts in any sense. However, we have not been unaware of this principle nor of the need for a giant powerplant. I quote from a speech of James G. Patton, president of the National

Farmers Union, to the Annual Convention of the Northwest Regional Rural Electric Cooperative Association, Billings, Mont., October 9, 1953:

"Hydro power and steam-generated power resources of the entire West should be harnessed to high-voltage, long-distance transmission lines, to pull the greatest possible load at the lowest possible cost for the people of the West.

"There is another reason for high-voltage, long-distance transmission. The giant coalfields of the West are located great distances from the big industrial and population centers of the West. These big population and industrial centers, where vast quantities of low-cost electricity are needed, are located in the Twin Cities area, in the Pacific Northwest, on the California coast, and on the Gulf Coast of Texas.

"These population centers lie on the fringes of a vast, 22-State Western Empire, with both giant hydroelectric sites and giant coal energy sites within the big circle that they form.

"The giant power plan calls for using high-voltage, long-distance transmission lines for hauling enormous quantities of energy out of the interior of the Western Empire to the centers of industry on its edges. That is a mammoth undertaking. It would be tremendously costly, in investment and operating costs, if it were to be attempted by an expanded railroad system, hauling energy in the form of coal. But our engineering experts tell us that the energy from a ton of coal can be hauled from North Dakota to Minneapolis much cheaper in the form of electricity, over high-voltage transmission lines, than on the most efficient railroad ever built.

"Transmission lines adequate for doing this job, for harnessing together the steam-generated energy of these three midcontinental coalfields with the big hydro plants of the river systems and atom-electric powerplants located in the most feasible sites—would have to be much longer than any in use today anywhere in the world. Power would have to be transmitted for distances of up to 700 miles. The giant basic powerplants in the coalfields, and the biggest hydroelectric dams, would all have to be tied together.

"This giant power plan would require voltages much higher than anything in use today in this country—at least half a million volts, twice as high as the highest voltage in use by utilities in this country today.

"The longest distance transmission in use in this country today is only 300 miles, less than half as far as the 700 miles that would be needed for a giant power project for the West.

"But the Swedes right now have a transmission line in use that is 600 miles long, from their big hydroelectric plants north of the Arctic Circle to the centers of Swedish industry and population in the South. They are transmitting electricity at 380,000 volts, or close to the half-million volts needed for a giant power system to serve the West. We would need only to go one notch beyond what Sweden has already done to make the giant power plan a reality.

"You may wonder why a farm leader should be telling a group of farmers about a plant for hauling fabulous blocks of energy out of the mountains and prairies of the West to the big cities on the coasts. This giant power plan means two great things for the future of agriculture in this region.

"If almost undreamed of quantities of electric energy were made available to western industrial and population centers, at rock-bottom prices such as would be possible under the giant power plan, it would start a tremendous boom of economic expansion.

"It would open up literally millions of new jobs in the space of a few years. It would result in great population growth not only in existing industrial centers, but throughout the West. There are huge stores of rich mineral and chemical resources in our mountains and prairies, waiting only for low-cost electricity to unfold into new and flourishing industrial developments.

"That means new markets for the farmers of the West. It means markets right here, in our own backyards, for our beef and mutton and grain. It means new markets for farm products that we don't even bother to produce in quantity now, for dairy products, fresh fruits and vegetables, poultry and eggs.

"In short, it will give western farmers profitable local markets for their products for the first time in history. It will free western agriculture from second-class citizenship in our national economy. For too long, the great farming area west of the Mississippi River has been nothing but an economic colony of the East. We have been treated like the British treated India for 200 years, as a colony for the production of cheap raw materials to enrich others.

"This giant power plan has real meaning for our own farming operations, too.

"We have all heard time and time again that the surface of rural electrification has barely been scratched. I don't think that any of us really grasps what the potentialities of the use of electricity in agriculture might be.

"But scientists talk about using electricity to warm up the soil of entire farms, so that crops can be started earlier to take advantage of spring rainfall and sunshine.

"They talk about using electricity for killing weed seeds electronically, field by field, before the crops are planted.

"They talk about electric-powered tractors. You'll back them into the shed at night to get their storage batteries charged off the high line, and run them all the next day at a small fraction of the cost of petroleum-fuel tractors.

"They even talk about some day being able to transmit electricity in tremendous surges of power directly to the moving tractor in the field—not over wires, but by wireless. You'd just tune in your radio on the powerplant, and take off. The United States Navy is engaged in research on wireless transmission of power right now.

"This sounds fantastic, I know. But up to only 10 years ago, probably not a single one of us would have believed that it would be possible to propel a huge submarine under the Atlantic Ocean on a few pounds of fuel. With atomic energy, that is a reality today.

"I do not believe we are in any danger of overestimating our possibilities. On the contrary, I think we will find that our imaginations are falling far short of what the real potentials for the future are. We have got to look far, far beyond the narrow limitations of the present in order to visualize the opportunities that lie ahead. Our real danger is not that we will dream too much but that we will cheat the generations ahead of us because we did not dream enough.

"When you count the potentialities of atomic energy, and the new, even more terrible and more wonderful potentialities of thermonuclear fusion, the process that we know as the hydrogen bomb, the strain on our abilities to dream enough is beyond the capacity of most human minds.

"It is thought not inconceivable that some day we will learn how to transmit electric energy directly out of an atomic pile, without going through the mechanical process of using atomic energy to boil water to create steam to turn a regular turbine."

President Patton discusses further possibilities of development and utilization of atomic power and nuclear electric power. While the Soviets and the British are forging ahead in nuclear electric power development, Admiral Strauss, head of the Atomic Energy Commission, was "fiddling around" with Dixon-Yates attempting to destroy the TVA and concocting various schemes designed to benefit the private electric power monopoly to the detriment of all the people. Over a period of years, Strauss and the Eisenhower administration have successfully prevented any substantial atomic energy electric power development. Although the Gore-Holified bill calling for a number of large-scale nuclear electric plants was passed by the Senate, Eisenhower's helpers in the House succeeded in defeating it there. Although Admiral Strauss had sufficient authority to go ahead with a large-scale atomic energy program, at the present time only one large-scale nuclear powerplant is in operation in the United States. This is the one at Shippingport, Pa., financed for the most part with Government funds and having a capacity of 65,000 kilowatts. According to my information, despite the boasts of the private utilities that we are ahead in the atomic energy race, Shippingport is the only nuclear powerplant in the United States having a capacity exceeding 5,000 kilowatts.

Here is an editorial from the American Public Power Association Atomic Power Newsletter of October 29, 1957, which summarizes the situation very well:

"NEEDED: A POLICY AND A PROGRAM FOR ATOMIC POWER

"The United States atomic power program has bogged down. There is hardly a power reactor project which is not in difficulty. Reactor manufacturers are recognizing that atomic power development is a tough and costly business and are retrenching. Meanwhile, the Atomic Energy Commission clings to its 'partnership' policy and the atomic power-development program lacks purpose and direction.

"Manufacturing firms which entered the power reactor field with high hopes are reducing or disbanding their reactor engineering staffs, according to prevalent rumors. Two firms formerly active in the field are said to have virtually

disbanded their reactor groups. One of the large reactor companies is rumored to have laid off about 100 reactor scientists and engineers. Another company has, it is said, dismissed 19 of its reactor engineering staff. As for the rest, an official of one reactor firm has said 'there is no more recruiting' of reactor engineers by private industry. Those laid off are having to take positions in fields other than reactor development.

"It is not difficult to understand this cooling of industrial ardor for developing atomic power. The job is 'more difficult and more costly than at first generally presumed,' to quote a phrase from the recent annual report of the Atomic Industrial Forum. While plans were in the paper stage, it was easy for industry to be optimistic. It was possible for the president of Pennsylvania Power & Light to declare to the Joint Committee on Atomic Energy that 'the public utility industry is prepared to do this job [of large power reactor construction], and under those circumstances the Government of the United States should not intervene.'

"However, during the past year project completion dates have slipped and estimated costs have risen alarmingly, for one reason or another. The Yankee Atomic plant, originally proposed for completion in 'late 1957' at an estimated cost of $33 million, is now scheduled for 1960 or 1961, at an estimated cost of over $50 million. The Power Reactor Development Co. project is now promised for completion in 1960 or 1961 instead of the original date of 'late 1958.' The plant proposed by Consumers Public Power District was originally planned for completion in 1959; the latest estimate is 1962 and costs have climbed from $25.1 million to $40.6 million.

"Consolidated Edison has reported a cost increase from $55 million to $90 million. Site construction is underway but core design is incomplete and plant completion by 1960 would be a remarkable achievement indeed. Commonwealth Edison still sticks to 1960 as the date for its plant of 180,000 kilowatts, the largest proposed, but reported changes in the core design of the recently completed pilot model may affect the core design of the Commonwealth Edison plant.

"The AEC partnership program to develop small nuclear powerplants—a program announced about 2 years ago—is a shambles. Of the 5 proposals by municipal and rural co-op systems given prolonged consideration by AEC, only 2 remain. The Holyoke, Mass, Ford instrument proposal was abrubtly thrown out by the Commission after 11 months of negotiation, with no adequate explanation by AEC to the sponsors or the public. (Despite the fact that AEC dismissed the Holyoke-Ford proposal as technically premature. Britain expects to have a reactor experiment of the same general type in operation by 1960.) The proposals of the Wolverine, Mich., rural co-op and the Elk River, Minn., cooperative are both indefinitely suspended due to recent massive increases in the manufacturers' cost estimates. Most significant, both manufacturers rejected the AEC requirement that prices be on a firm, maximum ceiling basis. The uncertainties of reactor development, the manufacturers concluded, require that the Government pay whatever it costs to build these early plants.

"The two projects left in the small power-reactor program are those proposed by Piqua, Ohio, and by the Chugach co-op and Nuclear Development Corp. combination. The Piqua project is still in negotiation with the Commission. AEC has signed a contract with NDA for research work on the second project and the question of a construction contract will not be considered until later.

"In 1955, AEC estimated that by the end of 1960 there would be 1,160,000 kilowatts of nuclear generating capacity in operation in the United States, exclusive of reactor experiments. At the present time, the only full-scale power reactor for which completion is certain is the Government-built PWR of 60,000 to 100,000 kilowatts at Shippingport, Pa. There now is little assurance that any other powerplant, aside from reactor experiments, will be in operation by the end of 1960.

"The recent annual report of the Atomic Industrial Forum said that "although industry in the past has been willing to operate at a loss or with very low profit margins as far as atomic energy work is concerned, there is a serious question of how long this practice can be continued.

"Meanwhile, Britain's expanded atomic-power program proceeds with increasing vigor. Despite much smaller resources in money, manpower, and laboratories, they are showing us what can be done if there is a will to do it. The Russians have cut back their earlier program but report plants underway larger than any we have planned.

"In view of the state of the Nation's atomic-power program, what now needs to be done? First, we must recognize that we are inescapably in a long, grim race with the Soviets for supremacy in this and other fields. Tangible evidence of atomic-power leadership is required not only for reasons of United States prestige and influence but for progress toward exploiting a new source of energy to help supply the seemingly insatiable needs of our domestic economy.

"Second, we must adopt a policy and program that will establish our supremacy.

"With a growing consensus that a positive Government program and substantial Federal investments are essential, the debates in the next Congress may well be about the type of expanded program to be adopted rather than whether such expansion is required. The issue may be that of a Federal construction program versus more liberal Federal assistance to privately proposed projects. However, the latter approach has been tried and the results have been unsatisfactory. It has the basic weakness of dissipating our efforts and placing the responsibilities for leadership and for accomplishment on no one in particular.

"Surely the present privately sponsored project should be allowed to go ahead, but it has become painfully clear that we cannot rely upon them alone to achieve objectives of urgent importance to the position of this country in the world.

"For 2 years, a majority of the Joint Committee on Atomic Energy has favored a program of Federal construction and operation of full-scale prototype atomic powerplants. It is proposed to build these at AEC installations and use the power in AEC plants, thus avoiding controversy over marketing the power. The American Public Power Association consistently has supoprted this legislation, on the grounds that it is the most effective way to speed the development of nuclear plants to the point that all utility systems can afford to install them in the normal way. With every passing month, this position receives further confirmation.

"It is time to put aside unfounded fears of socialism. In the next session, Congress should pass legislation along the lines of Gore-Holifield bill as promptly as possible. Legislation such as this provides the only sure means of pulling our atomic power program out of the doldrums."

Some of us hoped with the advent of sputnik, with rising unemployment, with the newspaper accounts of the great progress made in foreign countries which we have discussed, that some information might reach the ears of Eisenhower and his advisers which would bring about a much needed change in resource policy. Our hopes were dashed by the President's budget message which said in respect to water resources:

"The construction activities of the Corps of Engineers and the Bureau of Reclamation will be limited to orderly continuation of work started in prior years. We should not, at this time, add to this extremely high level of commitments by starting new projects. Construction on projects underway will go forward as economically as possible. Expenditures for maintenance and operation will provide reasonable protection of Federal investment."

We call attention to a statement delivered before the House Ways and Means Committee, January 17, 1958, by Budget Director Brundage:

"Another recommendation which should hold down budget totals is that no new project be started in fiscal 1959 for construction of water-resources projects by the Corps of Engineers or the Bureau of Reclamation in view of the high level of current spending resulting from the large number of new projects started during the last 3 years."

With respect to these remarks let us bear in mind that of the total budget of $72.5 billion only about $900 million or 1.24 percent is devoted to water-resource development so that, were all water-resource development deleted the saving in terms of the total budget would be almost imperceptible.

For 1959, there are again no proposals for new starts. Funds to continue projects already underway are requested but the adequacy of these funds to maintain economic and expeditious construction schedules is very questionable.

The $2 million request for construction funds to continue John Day is absurd on its face in view of the magnitude of the project, and I am reliably informed that the scheduled operation by Oahe Dam will be pushed back another year, and possible 2 years, if current budgetary requests prevail. With respect to natural resource development, the budget proposals can be summed up in a few words. It is a budget of reaction, reluctance, conservatism, caution, delay, and postponement.

Finally, we respectfully urge the two committees represented here to use all the power and prestige at their command to reverse such a policy which in the end will bring disaster and suffering to the Nation and its people. Not only if policies are not changed, will the United States lag behind the Soviet Union and became a second-rate power, but the economy may ultimately be thrown into a tailspin and unemployment will mount. Water shortages which are beginning to appear all over the United States will become more and more critical. The needs for electric power generated by hydroelectric thermal atomic energy means will be unsatisfied, and economic development for industry and agriculture will be arrested.

STATEMENT OF ALEX RADIN, GENERAL MANAGER, AMERICAN PUBLIC POWER ASSOCIATION

My name is Alex Radin. I am general manager of the American Public Power Association, a national trade organization representing more than 800 local publicly owned electric utilities, principally municipally owned systems, in 40 States, Alaska, and Puerto Rico. The association's headquarters are at 1025 Connecticut Avenue NW., in Washington, D. C.

Member systems of the American Public Power Association have a direct interest in full development oft he Nation's water resources. Many of our member systems purchase all or part of their power supply from Federal multipurpose water resource projects. For a number of years this association has maintained an active interest in this field, and has presented testimony before congressional committees in favor of maximum comprehensive development of the Nation's water resources, and in opposition to underdevelopment of these resources.

It was shocking to read the report which led to these hearings—a report showing that water resource development in Russia and Communist China is moving at a faster rate than that in the United States. Testimony already presented in these hearings adds further to the disturbing comparison. And just this month the New York Times told of a paper presented before the American Institute of Electrical Engineering by two General Electric Co. engineers who had been impressed by Russia's technological progress in the power field, especially in high-voltage transmission.

"There is no doubt that the Russians will lead the way in this field," one of these engineers said. He told of Russian work on 800,000-volt transmission lines—far ahead of anything our Nation is planning.

While we are concerned that these two Communist nations are developing their water resources and their electrical technology at such a rapid rate, there are three rather ironic facts about our own slowdown in recent years in water resource development:

1. Much of the water resource work being carried on in other nations, including Russia and Red China, seems to be based to some degree on American ideas and engineering, and on the examples which the United States set in the 1930's and 1940's.

2. Even though the United States recommends, and in some cases furnishes financial and technical assistance on multipurpose projects in other parts of the world, our own program is today typified by the no-new-starts policies of the current budget proposals. We seem to be placing a "For export only" label on our ideas, and are not practicing what we preach.

3. Yet today there is more need than ever for the United States to fully develop its vast water resources, in the face of an expanding population, amazing growth in the use of electric power, critical water supply problems, vastly increased use of water for irrigation, the continued ravages of flood waters, and other problems related to effective use of water resources.

WHY DEVELOP WATER RESOURCES ON COMPREHENSIVE RIVER BASINWIDE BASIS

The idea of developing our water resources on a comprehensive, basinwide basis is so plainly sound, logical, economical, and essential that it hardly seems necessary to belabor the point. Our Nation has a profitable example of this multiple-purpose development on the Tennessee River and its tributaries, where a series of dams and reservoirs serve several purposes, with untold benefits in flood control, navigation, power generation, recreation, national defense, and

related areas. We have the know-how, the undeveloped water resources and the financial ability to do this kind of river development job in many other parts of the Nation.

Multipurpose development takes wasting, often damaging waters and turns them into economic and social assets. It is both preventive and productive—preventing the human suffering and loss of lives and property that come from ravaging floods; and producing economical electric power, increased navigation, important water supply, and other benefits, such as pollution control, silt abatement, irrigation, recreation, etc. Controlled water is also an asset in the industrial development of river basins. While we think of flood control primarily in terms of preventing flood damages, there is also the fact that great land areas along our rivers are not used—for industrial and other development—because of the threat of floods.

In national emergencies, full development of our water resources becomes even more significant. Inadequate development weakens our basic economic strength, deprives us of the use of readily available assets which could be put to immediate productive use. Full development brings more electric power, a key ingredient in emergency production; adds an alternative transportation system for the Nation, thus giving us more flexibility for movement of goods; and gives the Nation a source of energy that can be made available in an instant, to serve important power loads.

An indication of the importance of power development to national defense is the fact that the vast reservoirs of power created by TVA and the Bonneville Power System represented one of the principal reasons for the location of atomic energy plants in the Tennessee Valley and the Pacific Northwest. The availability of large quantities of power in those areas also made possible the production of aluminum for the vital military aircraft program.

THE SPECIAL ROLE OF HYDROELECTRIC POWER

Without minimizing in the least the importance of developing all possible uses of the Nation's water resources, I would like to speak of the special role of hydroelectric power today and in the future.

Our use of electric power is growing at an almost unbelievable rate. By 1970, said Electrical World in its September 2, 1957, issue, the Nation will be using 1.7 trillion kilowatt-hours of electricity a year—nearly three times the present use. By the year 2000, some experts have predicted a national use of 10 to 12 trillion kilowatt-hours.

The coming of economical nuclear and thermonuclear power, and the great technical strides in huge thermal plants using fossil fuels, will mean that hydroelectric power will make up a relatively small percentage of the national total production of electric power. But the Nation will need all the power it can get, from every source.

Moreover, hydroelectric power has these special advantages:

1. It is economical. It is not subject to rising fuel costs, thus making possible continued low-cost power production over a period of 100 to 300 years.

2. It is ready in an instant, thus adding to a power system's flexibility and having special importance in handling emergency loads.

3. In the huge interconnected power network of the future, hydropower will be used primarily for "peaking"—that is, it will be brought on the line to handle demands during heavy use periods, leaving thermal plants to carry the around-the-clock loads. Thus hydroelectric power will make for more economical operation of an integrated power supply network, and will bring savings in both investment costs and operating expenses.

4. Hydroelectric power is the "paying partner" in many multipurpose water resource projects, making it financially feasible to build projects that bring many other benefits such as flood control, navigation, water supply and other benefits.

In summary, hydroelectric power will play an essential role in future efforts to provide the Nation with abundant power at low cost, and to make maximum effective use of our Nation's water resources.

HAVE WE FULLY DEVELOPED OUR WATER RESOURCES?

Sometimes we hear that all the Nation's best hydroelectric and multipurpose water resource sites have been developed, and that there is little potential for future development.

The facts indicate that actually we have only begun to develop our water resources.

Electric power

The most recent Federal Power Commission study of the Nation's hydroelectric potential showed that as of January 1, 1953, only 20 percent of the Nation's potential had been developed. Some 88 million kilowatts of electricity remained to be developed just 5 years ago—compared with less than 22 million kilowatts in use. Even assuming that the 6½ million kilowatts under construction in 1953 are now completed, the Nation still has well over 80 million kilowatts of undeveloped hydroelectric capacity. This is 60 percent of the total capacity of all generating plants of all kinds today.

To be more specific as to the location of undeveloped hydro power: As of 1953, only 28 percent of New England's hydroelectric potential had been developed, with more than 3 million kilowatts untapped. In the Middle Atlantic area, the States of New York, New Jersey, and Pennsylvania, only 21 percent of the hydroelectric potential had been developed, with well over 6 million kilowatts ready for development. In the West North Central area (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas), just 9 percent of hydro was developed; more than 6 million kilowatts was undeveloped. In the Pacific area—Washington, Oregon, California—where considerable development has taken place, only 18 percent of the potential hydro had been developed in 1953, and the staggering total of 30 million kilowatts remained to be developed. In the Mountain area (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, and Nevada), there were 22 million kilowatts undeveloped in a region where hydro potential is only 13 percent developed. Samples such as this indicate clearly that, proud though we are of the great projects that now dot the country, we have really only begun the job.

While experience has shown that the Federal Government should play an important role if maximum comprehensive development of our water resources is to be achieved, policies of the Government in recent years have done little to advance such development. For example, in the last five budget messages which have been submitted to the Congress, virtually no new starts have been requested for Federal hydroelectric power facilities.

Flood control

Even with the progress made in recent decades, newspapers each year still carry stories of human tragedy and property destruction from floodwaters. The Nation is still far from protecting its citizens against cruel and merciless floods. It has been estimated that flood damage has cost the American people some $5 billion over the past 10 years.

Navigation

In peacetime and in national emergency, the Nation's inland waterways system is of tremendous value. As more rivers are developed and more navigable channels are added, the Nation's commerce is stimulated. And in emergencies, waterways add an alternative transportation system, giving the Nation more flexibility in moving goods and material.

An example of the benefits of waterways development for navigation purposes is provided by the TVA. In 1933 river traffic was negligible on the Tennessee River. In 1957 more than 12 million tons of freight moved over the Tennessee River's waterway, an increase of nearly eightfold in river traffic since the entire navigation system was completed in 1945. Savings to shippers through lower transportation charges exceeded maintenance and operating costs by more than $16 million—a return of more than 11½ percent on the net navigation investment of $138 million.

Water supply

Little mentioned two decades ago, water supply is now recognized as an urgent problem. The Department of Commerce has estimated that between the present time and 1975 the need for water for drinking and bathing purposes would increase 65 percent; the need for water for irrigation would go up 42 percent, and the requirements for industrial processing would increase 100 percent. Storage reservoirs that regulate water flow provide a dependable, year-round source of water. And they make water available for irrigation needs, even when uncontrolled rivers would be too low to provide water supply. More and more, water supply will be a major factor in water resource development.

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Other purposes

There are other problems that water-resource development can help solve—recreation for a growing and increasingly urbanized population, pollution abatement and silt control on many rivers, land protection and use, wildlife conservation.

We have only begun to develop our water resources. Each passing year adds to the urgency for full development.

WHY ARE WE SLOWING DOWN ON WATER RESOURCE DEVELOPMENT?

In the face of these facts—the wisdom of comprehensive development, the lack of such development, and the growing need for it—why are we slowing down? Why are we permitting the Russians to move at a foster pace than we?

(*a*) *Budget problems*

These projects are sound capital investments and are important defense assets. To speak of them simply in terms of spending is to ignore the fact that they are productive, revenue-producing items. Development of water resources should take place only when such development is economically feasible. And when such development is economically feasible, there is no net cost—only a capital investment which is self-liquidating and which brings benefits far beyond the dollar cost. Such projects are among the wisest investments the Nation can make. They are investments the Nation cannot afford not to make if we are to develop our basic strength and stay ahead of competing nations.

(*b*) *Public versus private development*

Whether development is public or private should be considered only in relation to the end results to be achieved. The principal criteria should be full development, maximum benefits to the most people, and economic feasibility. It is tragic that opposition to full development has delayed or prevented the Nation from making best use of its water-resource assets as, for example, in the Hells Canyon case.

(*c*) *Individual interests versus general welfare*

With Communist nations moving at a faster rate than the United States in this field, we must make decisions based on the criteria listed above and must proceed with feasible projects without letting the narrow interests of a few people deprive the Nation of water resource benefits. The Nation's rivers are public, note private, property.

HOW TO ANSWER THE CHALLENGE

There are both present and long-range ways to answer the challenge that is before your joint committee. Both involve a clear recognition of the need for more water-resource development, of the economic and social benefits to be obtained, and of the fact that such development is a sound investment in the Nation's strength and well-being.

Immediate program

1. Favorable congressional action on water-resource projects now before the Congress, such as Federal development of power facilities in the Trinity River division of the Central Valley project in California; full development of the Hells Canyon stretch of the Snake River, as approved last year by the Senate; and other projects where maximum comprehensive development is essential. We recommend that the Congress look particularly to means of accelerating the resource development program in the Pacific Northwest which contains some 40 percent of the Nation's hydroelectric power potential.

2. A more realistic cost allocations formula for multipurpose Federal projects, to replace Budget Bureau Circular Letter A–47 which has served to stifle desirable development. In this regard, Senate Resolution 148 which the Senate recently approved is a step in the right direction—to give Congress the facts it needs for making effective decisions on proposed projects.

3. Action by the executive branch to follow congressional intent in carrying out present laws, including the Federal Power Act, relating to water-resource development. If the executive branch does not take a more positive approach to these matters, the Congress should then consider legislation which will more strictly define its intentions in this area.

Long-range program

We earnestly recommend prompt authorization of a congressional study of (*a*) the Nation's water-resource needs, in 1975 and 2000, and (*b*) the Nation's electric energy needs, in 1975 and 2000.

Such a study, by appropriate committees of the Senate, would enable the Nation to plan water-resource projects to meet its future long-range needs. Without such a factual basis, including information on navigation, flood control, water supply, power, and other purposes, we would be in the position of answering the Soviet challenge on a haphazard and uncoordinated basis.

In connection with hydroelectric power as a part of full water-resource development, there is the broader question of planning to provide adequate power for enormous United States needs of the future. There is general agreement that we are moving into the age of giant power.

In this giant power age, future planning and policies should assure adequate supplies of low-cost wholesale power at nondiscriminatory rates for private, public, and cooperative utilities alike. This is the only way to meet the Soviet challenge, to rise above the public-private power controversy, and to allow all utilities to devote full attention to providing low-cost power and good electric service to the people and industries of the United States. Surely our democracy is capable of achieving this sort of constructive solution, especially when engaged in a most fateful international competition.

(The following communications and enclosures were ordered to be printed by the chairman:)

DEPARTMENT OF THE ARMY,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, D. C., February 26, 1958.

Mr. GOODRICH W. LINEWEAVER,
Interior and Insular Affairs Committee,
United States Senate.

DEAR MR. LINEWEAVER: In response to your telephone conversation with Colonel Robertson, requesting additional information for the Interior and Insular Affairs Committee, I am inclosing a paper entitled "Comparison of Requests for Appropriations by Corps of Engineers With Bureau of Budget Action." This material covers the period fiscal years 1955 to 1959, inclusive.

I trust this information fulfills your requirement.

Sincerely,

E. C. ITSCHNER,
Major General, United States Army, Chief of Engineers.

COMPARISON OF REQUESTS FOR APPROPRIATIONS BY CORPS OF ENGINEERS WITH BUREAU OF BUDGET ACTION

(Exclusive of permanent appropriatons for maintenance and operation, control of hydraulic mining debris, payments to States, etc.)

FISCAL YEAR 1955

In preparing its budget request for fiscal year 1955, the corps was allowed to include amounts within and over the ceiling set by the Bureau of the Budget as follows:

Within ceiling request	$451,419,000
Overceiling request	179,465,000

The approved budget allowance for that year was $451,647,000.

The overceiling amount which was not allowed included additional funds for prosecution of going projects, and funds for starting the following projects:

Project	*Amount requested*
New Cumberland locks and dams, Ohio and West Virginia	$1,500,000
Tampa Harbor, Fla	700,000
Illinois Waterway-Calumet-Sag (modified), Ill	5,000,000
Houston ship channel, Texas	500,000
Toronto Reservoir, Kans	1,500,000
Rough River Reservoir and channels, Kentucky	650,000
Barre Falls Reserovir, Mass	1,000,000
North Adams, Mass	940,000
Cape Girardeau, Mo	750,000
East Poplar Bluff and Poplar Bluff, Mo	302,200
Pomme de Terre Reservoir, Mo	1,000,000
Davenport Center Reservoir, N. Y	1,000,000
Roseville, Ohio	500,000
Ferrells Bridge Reservoir, Tex	1,000,000
Sutton Reservoir, W. Va	1,500,000
Table Rock Reservoir, Ark. and Mo	3,000,000

FISCAL YEAR 1956

The amount requested by the corps was $579,020,000, and the approved budget allowance was $543,455,000. These figures do not include $31,600,000 for emergency work in New England after the 1955 flood. The difference includes reductions in funds for continuation of going work and the amounts requested for starting the following projects:

Project	*Amount requested*
Sitka Harbor, Alaska	$400,000
Wrangell Harbor, Alaska	220,000
Apalachicola River channel improvement, Florida	500,000
Beals Harbor, Maine	200,000
Newark Bay, Hackensack and Passaic Rivers, N. J	1,000,000
East Chester Creek, N. Y	664,000
Jamaica Bay, N. Y	470,000
Manteo Bay, N. C	47,000
Freeport Harbor, Tex	445,000
Grays Harbor and Chehalia River, Westhaven breakwater	324,000
San Joaquin River and tributaries, California	500,000
Sny Basin, Ill	500,000
Kansas Citys, Kans. and Mo	700,000
Rough River Reservoir and channels	900,000
Pomme de Terre Reservoir, Mo	1,000,000
Mathews Canyon Reservoir, Nev	400,000
Batavia, N. Y	159,000
Canyon Reservoir, Tex	750,000
Sutton Reservoir, W. Va	1,000,000
Wheeling-Benwood, W. Va	1,000,000
Fort Peck (2d powerplant), Mont	1,500,000

FISCAL YEAR 1957

The amount requested by the corps was $590,739,000, and the approved budget allowance was $582,377,000. The difference includes reductions in funds for continuation of going work and the amounts requested for the following projects:

Project	*Amount requested*
Port Hueneme, Calif	$815,000
Kawaihae Harbor, T. H	200,000
Mississippi River between Ohio and Missouri Rivers, Ill. and Mo., regulating works	200,000
Bayou Segnette Waterway, La	435,000
Dam 8, Monongahela River, Pa	500,000
Port Aransas-Corpus Christi Waterway, channel to La Quinta	500,000
Dardanelle lock and dam, Arkansas	500,000
Eufaula Reservoir, Okla	2,000,000

FISCAL YEAR 1958

The amount requested by the corps was $683,390,000, and the approved budget allowance was $632,130,000. The difference is largely due to reductions in amounts for continuation of going work and only one project for which construction funds were requested was not allowed: McGee Bend Dam, Tex., $3,500,000 requested.

FISCAL YEAR 1959

The amount requested by the corps was $712,350,000, and the approved budget allowance was $626,020,000. Since criteria for preparation of the budget request did not allow for new starts, the reduction in the request represents, almost entirely, a reduction in amounts for continuation of going work. Items covering provision of recreational facilities at completed projects, amounting to a request for $1,025,000, were also disallowed.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D. C., March 11, 1958.

Hon. JOSEPH C. O'MAHONEY,
United States Senate, Washington, D. C.

DEAR SENATOR O'MAHONEY: Pursuant to the request made to Mr. John B. Bennett during a hearing on S. 248, we are enclosing a tabulation of amounts requested by the Department of the Interior for Bureau of Reclamation reconstruction and rehabilitation, and the amounts allowed by the Bureau of the Budget, for the fiscal years 1955 to 1959, inclusive. Amounts requested and allowed for new starts are shown separately.

Sincerely yours,

FRED G. AANDAHL,
Assistant Secretary of the Interior.

Bureau of Reclamation

Amounts requested by the Department and the amounts allowed by the Bureau of the Budget for annual appropriations

	1955		1956		1957		1958		1959	
	Amount requested	Amount allowed	Amount requested	Amount allowed	Amount requested	Amount allowed	Amount requested	Amount allowed	Amount requested	Amount allowed
Construction and rehabilitation:										
Going work	$171,566,697	$124,137,855	$171,354,000	$136,440,000	$152,485,000	$139,195,000	$143,994,000	$129,333,000	$130,675,000	$127,737,000
New starts:										
Yuma auxiliary project, Arizona	100,000	100,000								
Palo Verde project, Arizona-California			1,985,000	1,985,000						
Santa Maria project, California			1,000,000	1,000,000						
Michaud Flats project, Idaho			520,000	520,000						
Collbran project, Colorado	1,000,000		750,000		1,000,000	1,000,000				
Canadian River project, Texas	1,000,000									
Crooked River project, Oregon							850,000	850,000		
Little Wood River, Idaho							400,000	400,000		
Wapinitia project, Oregon							400,000	400,000		
Rogue River, Talent division, Oregon			2,530,000							
Chief Joseph, Foster Creek division, Washington			631,000	631,000						
Savage Rapids, fish protection facilities					208,000					
Ventura project, California					4,400,000	4,400,000				
Washita Basin project, Oklahoma					500,000	500,000				
Missouri River Basin:										
Ainsworth unit, Nebraska	1,000,000		1,000,000		1,600,000		1,100,000	1,100,000		
Glendo unit, Wyoming	[1] 2,000,000									
Helena Valley unit, Montana	[2] 273,000									
Nickwall unit, Montana	321,000		293,000							
Owl Creek unit, Wyoming	311,000									
Sargent unit, Nebraska	[3] 1,000,000									
Shoshone Extensions unit, Wyoming	818,000		807,000				500,000	500,000		
Yellowtail unit, Montana	2,000,000		5,000,000							
Hanover-Bluff unit, Wyoming	[4] 437,000									
Farwell unit, Nebraska							750,000	750,000		
Subtotal, new starts	10,280,000	100,000	14,516,000	4,136,000	7,708,000	5,900,000	4,000,000	4,000,000		
Transfer to other Department of the Interior agencies, Colorado River storage project and participating agencies							346,000			

Missouri River Basin:										
Investigations	4,100,000	2,441,000	3,915,000	2,915,000	3,105,000	3,105,000	3,355,000	3,000,000	2,240,000	2,000,000
Other Department of the Interior Agencies	2,240,000	2,240,000	3,482,000	2,550,000	2,700,000	2,700,000	3,187,000	3,125,000	3,125,000	3,000,000
Payment to Shoshone and Arapahoe Indian Tribes		1,009,500								
Loan program							[4] 7,700,000	7,700,000		
Anticipated savings and slippage	−905,697	−3,409,355					−2,000,000	−11,500,000		−9,500,000
Total, construction and rehabilitation	187,281,000	126,519,000	193,267,000	146,041,000	165,998,000	150,900,000	160,582,000	135,658,000	136,040,000	123,237,000
Payment to Shoshone and Arapahoe Indian Tribes	1,009,500									
Upper Colorado River Basin fund, Colorado River storage project and participating projects:										
Going work							24,479,000	23,900,000	41,040,000	37,705,000
New starts:										
Flaming Gorge unit, Utah-Wyoming					1,300,000	1,300,000				
Glen Canyon unit, Arizona-Utah					5,124,700	5,124,700				
Transmission division							114,000	100,000		
Central Utah, Vernal unit, Utah									500,000	
Paonia project, Colorado									500,000	
Subtotal, new starts					6,424,700	6,424,700	114,000	100,000	1,000,000	
Advance planning					1,575,300	1,575,300	549,000	1,142,000	720,000	720,000
Total, Upper Colorado River Basin fund					8,000,000	8,000,000	25,142,000	25,142,000	42,760,000	38,425,000

[1] Initial appropriation, Supplemental Appropriation Act, 1955, $1,000,000.
[2] Initial appropriation, Supplemental Appropriation Act, 1955, $250,000.
[3] Initial appropriation, Supplemental Appropriation Act, 1955, $1,000,000
[4] Initial appropriation, Supplemental Appropriation Act, 1955, $450,000.
[5] Initial appropriation, 2d supplemental 1957, $12,700,000.

DEPARTMENT OF STATE,
Washington, D. C., February 27, 1958.

Hon. JAMES E. MURRAY,
Chairman, Committee on Interior and Insular Affairs,
United States Senate.

DEAR SENATOR MURRAY: In the joint letter from you and Senator Chavez of January 27, the Department was requested to comment on Senate Resolution 248 and on a committee print of a memorandum from the chairman to members of the Senate Committee on Interior and Insular Affairs.

The memorandum has been reviewed by the Department, and I am enclosing a document in which certain comments, essentially in the nature of elaboration and refinement of the description of the data on developments in the U. S. S. R. and (Red) China, are made. I hope this will be useful to the committee.

If the committee desires, I would be glad to arrange to have presented to the Committees on Interior and Insular Affairs and Public Works, meeting jointly under the acting chairmanship of Senator O'Mahoney, the instances of United States participation in water-resource development projects in other countries and the reasons therefor.

Sincerely yours,

WILLIAM B. MACOMBER, Jr.,
Assistant Secretary
(For the Secretary of State).

RIVER AND WATER RESOURCE DEVELOPMENT IN SOVIET RUSSIA AND (RED) CHINA

This memorandum comments on the factual presentation of this subject contained in the Senate Committee on Interior and Insular Affairs report (committee print) entitled, "Relationships of River and Related Water Resource Development Programs of the United States, Soviet Russia, and (Red) China." Factual material contained in the report was supplied, in part, by the Department of State.

The comments submitted are in the nature of elaboration and refinement and, to a limited extent, presentation of material which has become available in the interim since the Department's data was furnished for the report.

A. SOVIET UNION

1. Hydroelectric power (p. 8)

The phrase "As can be seen from table 3" in the second sentence (bottom of p. 8) should be deleted, since table 3 in the original material transmitted for the report was not reproduced in the congressional document.

2. Irrigation (pp. 11–13)

(*a*) The statistical table (p. 12, bottom) on irrigated areas in the United States and the U. S. S. R. should be footnoted to indicate the probability that the total of 30.6 million acres of irrigated land shown for the Soviet Union is inflated by the inclusion of "watered land." (See text, bottom of p. 11.) This inflated figure would then be placed in better perspective in relation to the statement attributed to Konwar Sain, an Indian engineer (end of irrigation section, p. 13), to the effect that total irrigated area in the Soviet Union amounted to 20 million acres in 1955.

(*b*) The discussion in page 13 of the Hungary Steppe project to extend the irrigated cotton-growing area by 741,000 acres over a 5-year period appears to be overemphasized; the discussion does not make it clear that this project is part of the planned total expansion of irrigated land. The project, ambitious as it is, amounts to 14 percent of the projected expansion of total irrigated land by 5.2 million acres (2.1 million hectares, p. 12, second paragraph) in 1956–60, and 24 percent of that part (60 percent—1.26 million hectares, or 3.1 million acres) which is to be derived from improvement of existing irrigation systems.

3. Inland transportation (pp. 14–15)

(*a*) In the breakdown of the total freight tonnage on page 15, not ton figures, as reported, but percentage figures seem to have been used. The 1956 ton figures according to a Russian source were:

	Millions of tons
Petroleum	15.0
Timber	72.4
Grain	5.6
Salt	2.0
Coal	8.8
Mineral building material	33.0
Miscellaneous	10.0
Total	146.8

The correct total figure of 146.8 million tons appears in table 4 of the report.

The heading of column 1 of table 4 should read "Navigable length of waterways," since the increase of about 50,000 kilometers between 1928 and 1956 is mainly due to amelioration of existing natural waterways and only to a small extent to the building of artificial waterways.

On page 14, statistics attributed to the Department of Commerce compare railroad and inland waterways performance in the U. S. S. R. The inland waterways figures for 1955 should read 67.4 (as in table 4) and not 57.4. Comparable figures for 1956 are available now; namely, 1,079.1 in the case of railways and 70.2 in that of inland waterways (IWW).

Attention also might be called to the fact that U. S. S. R. rail performance grew much faster than IWW performance, as may be seen from the following chart:

	Billions of ton kilometers		Increase in percent, about
	1928	1956	
Railroads	93.4	1,079.1	1,055
Inland waterways	15.9	70.2	341

It also may be of interest to note that (*a*) from 90 to 100 percent of the shipments are moved under the direct control of the Ministry of the River Fleet and its subagencies and that (*b*) at least 50 percent of the cargo is hauled on the Volga River and its affluents (Vodny Transport, Moscow, August 29, 1957).

The report on page 15 speaks of a 38-year span, which seems to be a misprint, since what is meant is obviously a 28-year span (1928–56).

(*b*) The statement that the "Soviets have been disappointed with the slow growth of traffic on the Volga-Don Canal and its failure to relieve the overloaded railways" (on p. 15) really refers to most of the waterway traffic in European Russia. Soviet observers complain more specifically of the "extremely slight" share in shipments of bulk cargo, quoting the figure of less than 9 million tons of coal carried on inland waterways in 1956 as compared with a grand total of 400 million tons moved by all means of transportation (Rechnoy Transport, Moscow, February 1957). The primary reason given by Soviet observers for the relative insignificance of IWW traffic was that many river rates were higher than the railway rates between the same localities (Rechnoy Transport, January 1957). New transport rates were introduced for the navigation season 1957. Like the former rates, they frequently are below cost (Vodny Transport, April 27, 1957). Costs on the waterways are higher not only because the river distances between two localities may be much longer than the rail distances (as e. g., 2,582 against 1,116 kilometers between Moscow and Stalingrad) but also because poor utilization of the facilities is said to lead to their rapid deterioration and to necessitate costly repair and reconstruction work (e. g., Vodny Transport, January 24, 1957).

B. COMMUNIST CHINA

1. Communist China developments (p. 16)

The historical material in the fifth paragraph should be qualified. Huang-Ti, the Yellow Emperor, is a legendary figure from prehistoric times; however, from the beginnings of recorded history river transport, irrigation, and flood prevention were developed arts in China and considered an important responsibility of the Government. Again, although Khubilai Khan restored, extended, and named the Grand Canal in the 13th century A. D., history records that a similar waterway was built in the 6th century A. D., while important sections had been constructed as early as the 6th century B. C.

2. General information on Red China (pp. 16–17)

The Chinese Communist official referred to as "Director Hao" also as "Hoa" is believed to be Dr. Wong Wen-hao, who headed the Chinese National Resources Commission during 1946–48 and now reportedly holds an important advisory post under the Chinese Communists relating to resource development and geological surveys. General Fu Tso-yi, who surrendered Peiping to the Chinese Communists in 1949, has been Minister of Water Conservancy since the establishment of the Chinese Communist Government.

3. Twenty million work on development (p. 18)

The reason why so many laborers can be used is that they are mobilized in the off-seasons (between harvest and planting). They constitute a large proportion of the population in the vicinity of the project. Actually, many additional millions are mobilized for local projects which are not included in these statistics.

4. Red China's power production (p. 20)

The power production figures cited are from Communist China's first 5-year plan (1953–57) which was not published until June 1955 when it was presented by Li Fu-chun, chairman of the state planning commission, to the (Chinese Communist) National People's Congress in Peiping. The planned increase in electric powerplant capacity was from 2 million kilowatts in 1952 to 4 million kilowatts in 1957. The installation of new capacity has proceeded according to schedule, reaching the target by the end of 1957. However, because of power shortages and a resultant increase in plant utilization, power output in 1957 actually reached 19 billion kilowatt-hours.

5. Compared with Shasta powerplant (pp. 21–22)

The legend that the industrial plant of Manchuria was destroyed by retreating Japanese and Kuomintang forces in a Chinese Communist rewrite of history to hide the embarrassing fact of the Soviet looting and stripping of Manchuria after World War II. The Feng-man dam had not been completed at the end of the war; of the eight 70,000-kilowatt generators, four were installed and four partially installed. The Soviets removed all construction and generating equipment, except for two generators with a total capacity of 140,000 kilowatts (plus 2 small generators of 3,500 kilowatts each). Though nearly complete, the dam had not been raised to its designed height, and, with only two turbines in operation, the reservoir was vulnerable to floods which occurred in the summer of 1949 and resulted in some damage to the dam. Subsequently the Chinese Communists repaired the damage and completed the dam. They contracted to purchase additional generating units from the U. S. S. R. in 1950; the first 2 units were installed in 1953 while the sixth and last is scheduled to be installed in 1958, which will raise capacity to slightly more than—not "well over"—its designed capacity of 560,000 kilowatts under the Japanese.

While the Chinese Communists have completed a number of other hydrostations, these have been of rather small scale. In 1952 hydro capacity totaled 186,000 kilowatts, including 143,000 kilowatts at Feng-man and 36,000 kilowatts at Ching-po, another Japanese installation in Manchuria. During 1953–57 498,000 kilowatts of hydro capacity were added, including 350,000 kilowatts at Feng-man, 48,000 kilowatts at Shih-tze-tan in Szechwan province (completing a project initially planned and designed by the Chinese Nationalists during World War II), 30,000 kilowatts at Kuan-t'ing (designed primarily for flood control in the Peiping area), and 70,000 kilowatts in a number of much smaller hydrostations.

At present, hydrostations with a design capacity totaling 2,500,000 kilowatts are under construction, including the 1,100,000-kilowatt San-men gorge project, but not the Liu-chia gorge proposal which cannot be implemented until rail facilities

are improved in the area. Present targets for 1962 call for the installation of hydro capacity equivalent to only 70 percent of the projects now under construction.

6. Seven thousand experts to work on the Yangtze (p. 22)

Present indications are that the 20-million kilowatt Yangtze Gorge development has been postponed indefinitely. The planners estimated that the project would cost about US$4 billion and would require an investment of some $24 billion in industrial plant in its vicinity to utilize the power generated. Since this is close to the total investment planned for the second 5-year plan (1958–62), they have concluded that this project is too ambitious for the present sage of China's development. They are, however, planning smaller developments on the tributaries to the Yangtze.

The Chinese Communists place their theoretical water power potential at 540 million kilowatts, a calculation apparently based on the total amount of water and the distance of its fall in the rivers of China. Their estimats of the potential which could be practically harnessed have been steadily rising and now stand at 300 million kilowatts, nearly double the 1953 estimate. The sharp rise in the latter estimate is believed to be more the lowering of standards of practicability than of the discovery of new dam sites.

7. Water transport in Red China (pp. 23–24)

Inland waterways once were the prime movers of China, but today, following industrial development, they are regarded only as an important supplement to the railways. During the first 5-year plan (1935–37) development of inland waterways was relatively neglected in favor of the railways. At present, however, with the railways heavily congested and little prospect that the strains will be quickly relieved, the regime is looking toward inland water transport to relieve some of the pressure on the railways. Also, the regime has found that the development of roads and motor-vehicle transport to open up the rural areas has been too costly, particularly in terms of import requirements, and is now planning a greater effort to open streams and small tributaries to navigation by launches and sampans.

As noted above, the Yangtze Gorge development has been shelved.

The Communists have compiled data on shipping and water transport as follows:

	Goods carried (million tons)	Goods mileage (billion ton-kilometers)
Railways	246	120.0
Waterways	120	27.0
1. River, ship, and barge	35	12.9
2. Coastal, ship, and barge	11	8.6
3. River and coastal, junks and sampan	74	5.5
Roads	379	5.0
1. Motor vehicles	79	3.5
2. Carts and pack animals	300	1.8
Total	745	182.0

The total length of Communist China's streams and rivers is reported as 320,000 kilometers, of which 120,000 kilometers are navigable to native craft and about one-third of this to powered vessels. The Yangtze River and its tributaries constitute two-fifths of the navigable waters, on which 75 percent of the river freight and 85 percent of the river ton-kilometers is carried.

8. Red China irrigation (p. 24)

The Chinese Communist river-development program is primarily oriented toward flood control, and the irrigation benefits are largely incidental and not of great importance in the expansion of irrigated acreage. Without power pumping facilities and in the absence of high dams, the use of river water for irrigation is limited to low-lying areas where canals and ditches can distribute the water by gravity flow. The area so irrigated in 1955 was 6.6 million acres, or one-tenth of the total irrigated land. One-half of the irrigated land was served by

10 million small ponds and reservoirs which depend on mountain streams and rainfall, and irrigated an average of 3.5 acres each. Another 20 percent of the irrigated land was served by 8 million shallow wells, utilizing subsurface water which was lifted and distributed by hand labor and served an average of 1.6 acres each. The remaining irrigated land consisted largely of terraced paddy fields which received their water by gravity flow from nearby mountain streams.

The first 5-year plan (1953–57) called for an expansion in the irrigated area of 12 million acres, of which less than 6 percent would be derived from the central government projects while the bulk would arise from the small-scale projects (ponds, wells, etc.) undertaken by individual peasants. With the near completion of agricultural collectivization at the end of 1955, the irrigation program was greatly stepped up in the winter of 1955–56, when it was claimed that over 15 million acres were brought under irrigation. The program was cut back sharply in the winter of 1956–57, when the main effort was to review the program and correct the admittedly extensive errors in the design and construction of the various ponds, wells, etc. In the winter of 1957–58 a renewed effort is being organized, and it is claimed that 100 million peasants, or nearly the entire adult male farm population, have been mobilized for irrigation, drainage, and soil-conservation projects.

9. Irrigated areas more than 71 million acres (pp. 24–25)

In the absence of accurate surveys, the Chinese Communists do not profess to have an exact figure on their total cultivated land. However, with their control over the countryside they claim to have located some 30 million acres of farm land formerly hidden from the tax collectors, and the 1956 Indian agricultural mission to China reported that the Chinese were confident that their estimates were fairly accurate. With respect to the estimates of irrigated land, however, there is a much greater margin of error. Since it is a matter of judgment how much acreage an individual pond or well will irrigate, it is highly probable that the localities have exaggerated their irrigation achievements to satisfy the targets handed down by the central government. The Chinese Communists developed a fairly consistent set of data on irrigated land up to 1955, but since the start of a crash program to expand irrigated land the data have been confused and inconsistent.

Although the Chinese Communists claim to have increased irrigated land from 38 million acres in 1949 to 87 million acres by July 1957, these figures should be taken with a grain of salt. Before World War II official estimates placed the irrigated land at about 50 million acres. However, Dr. J. L. Buck, an agricultural economist at the University of Nanking, who conducted a 4-year survey of Chinese agriculture under a Rockefeller Foundation grant during 1929–33, noted that official statistics understated total cultivated land, the rural population, and the amount of irrigated land, which he placed at 90 million acres. It seems highly probable, therefore, that much of the increase reported by the Chinese Communists reflects in part an improvement in statistical coverage and in part a restoration of pre-World War II facilities.

With respect to the division of central and local projects, there is no fixed size. Local projects would be very much smaller than 10,000 mou, while the few central projects would probably be very much greater.

In December 1957 the Chinese Communists outlined their second 5-year plan irrigation program at an irrigation conference held in Peiping. They estimated total cultivated acreage at 280 million acres, of which 87 million acres were under irrigation. However, of this irrigated area, 25 million acres were not adequately protected to withstand 50 days drought while the facilities on another 6 million acres were in need of reconstruction or repair. The conference estimated that of the remaining farmland over 100 million acres could be irrigated, primarily through the digging of wells in the extensive north China plain. Land subject to serious flood hazard was estimated at 17 million acres, of which 4 million acres had already been protected by previous flood-control projects against all but the most serious floods (occurring on an average of once in 10 years). Erosion problems were serious over one-sixth of the land area of China, one-third of which consisted of 580,000 square kilometers in the upper and middle reaches of the Yellow River Basin; control measures had been taken over less than one-tenth of the affected areas.

Against these estimates, it was proposed that during 1958–62 some 32 million acres would be added to the irrigated acreage while irrigation facilities would be repaired or improved on 17 million acres. The remaining 13 million acres subject to serious flood hazard would be protected against 9 out of 10 years'

flood conditions, while erosion-control measures would be extended to 30 percent of the area over which erosion was a serious problem.

ADDRESS BY AMBASSADOR WILLIAM S. B. LACY BEFORE THE NATIONAL PRESS CLUB

EXCHANGE AGREEMENT WITH THE U. S. S. R.

I speak to you today as a diplomat, not as a statesman. The difference between a diplomat and a statesman is not unlike the difference between a carpenter and an architect. Both serve a good and vital purpose in the world. But it is more customary, more appropriate and more informative at a meeting such as this one to hear a speech by the architect of a project than one by the carpenter.

I labor today under the additional handicap of following by less than a month a significant speech here by one who is both chief architect and master carpenter of the particular structure upon which I also am employed.

I

We are to talk today about East-West exchanges, specifically the agreement recently concluded between the United States and the Soviet Union in this field. The matter of increased contacts between East and West was discussed at the meeting of Heads of State at Geneva in July of 1955, and the position of this Government was restated by Secretary Dulles at the meeting of foreign ministers later that year, where he submitted a 17-point proposal for the broadening of contacts in many areas.

During the months preceding the Soviet intervention in Hungary a small but significant exchange was underway. Consideration of increased exchange was suspended as a result of the Soviet intervention in Hungary in late 1956, but was resumed last summer with an initial United States proposal for an exchange of radio and television broadcasts. This Government accepted a Soviet proposal for a full-dress discussion of the exchange program, and a meeting in Washington in October was scheduled. After approximately 3 months of negotiations, an agreement was, as you know, signed late last month.

II

I am sure you are aware of the general nature of the agreement, but let me review its details.

Radio, television, and movies

It was agreed, in the first place, to exchange radio and television broadcasts in the fields of science, technology, industry, agriculture, education, public health, and sports. There was agreement on exchanges of equipment and exchanges of delegations of technicians in this field. As to political broadcasts, it was agreed that there would be—to quote—"from time to time an exchange of broadcasts devoted to discussion of such international political problems as may be agreed upon between the two parties." I wish to emphasize that the word "parties" in this context means for the United States the radio and TV industry.

This agreement was further qualified by a statement that the texts of such broadcasts will be exchanged in advance and that, if either party considers that such a broadcast—again I quote—"will not contribute to betterment of relations betwen the United States of America and the Union of Soviet Socialist Republics, the exchange of such broadcast shall not take place." I am happy to be able to report that we are in consultation with the National Association of Broadcasters through its president, Harold Fellows, to obtain advice and guidance from the industry in carrying out the relevant provisions of the agreement.

In the field of motion pictures there was agreement in principle on the sale and purchase of motion pictures by the film industries in both countries, an exchange of documentary films, and the interchange of delegations of motion-picture personalities, scenario writers, and technical personnel. Here I should like to salute the patriotic manner in which the entire motion-picture industry closed its ranks and offered its services, not only to the successful conclusion of this agreement, but more importantly, to its effective execution.

Industry, agriculture, and medicine

It was agreed also to exchange delegations this year in the fields of iron and steel, mining, and the plastics industry. There was also agreement on an exchange of delegations of specialists in agriculture and medicine during 1958–59.

Visits by scientists

The Academy of Sciences of the Soviet Union and the National Academy of Sciences of the United States will arrange for a reciprocal exchange of scientists and specialists for lectures, seminars, and joint studies, in fields including nuclear physics and nuclear mathematics. This month Dr. Detlev Bronk will depart for Moscow for consultations on this exchange. The Soviet Ministry of Health this year will send to the United States a group of medical scientists to deliver lectures and exchange experiences and will receive a similar group of United States medical scientists. This year also the Soviet ministry of agriculture, on a reciprocal basis, will invite American scientists to visit the Soviet Union to deliver lectures and exchange experiences in the principal agricultural fields.

University exchanges

Both parties to the agreement will provide for an exchange this year of 4 delegations of university professors and instructors for a period of 2 to 3 weeks in the field of the natural sciences, engineering education, and the liberal arts. Each delegation is to consist of from 5 to 8 persons. The agreement provides for an exchange of delegations of professors and instructors between Moscow and Columbia universities and Leningrad and Harvard universities. There will also be an exchange of students between Moscow and Leningrad universities on the one hand, and United States universities on the other, amounting to 20 persons on each side during the academic year 1958–59 and 30 persons on each side during the academic year 1959–60.

Athletes, writers, artists and entertainers

The agreement provides for basketball games, wrestling matches, track and field contests, weight-lifting contests, hockey games, and chess tournaments between representative teams of the two countries. There are also provisions for reciprocal visits of writers, composers, painters, sculptors, and student newspaper editors. For example, the Philadelphia Symphony Orchestra will be invited to visit the Soviet Union in May or June of this year, and the ballet troupe of the Bolshoi theater will be invited to the United States in 1959.

Exhibits and publications

There was agreement on an exchange of exhibits on the peaceful uses of atomic energy this year. The two parties agreed to promote further development of exchanges of publications between scientific institutions and societies and between individual scientists and specialists. Provisions will be made for an exchange of medcal journals and medical films. There was also agreement on the desirability of promoting the distribution of the magazine Amerika in the Soviet Union and the magazine USSR in the United States on a basis of reciprocity.

Direct air flights

There was agreement in principle on the establishment of reciprocal direct air flights between the United States and the Soviet Union. Negotiations on the terms and conditions will be conducted later.

Further negotiations

Among those matters remaining to be negotiated, in addition to a specific agreement for air travel, are details of radio and film exchanges, further exchange of industrial delegations, and certain abstracts to a freer exchange of persons and information.

It must be clearly understood that the United States did not get all they wanted in this negotiation. Neither did the Soviets. And yet I am sure both sides are satisfied that they gained something worthwhile. No agreement arrived at by two powerful negotiating entities has any meaning or durability unless it is reasonably acceptable to each side. What makes negotiation fruitful, and possible, is that the values involved are not mathematically agreed-upon quantities, but necessarily differ by the estimation of the interested party. So it is possible for both sides to come away feeling quite successful.

III

So much for the background and substance of these negotiations. Now, what does the agreement mean?

In the first place, we must accept that this is something less than a Magna Carta of East-West dealings. We are at the beginning stage of the preliminary arrangements for getting our foot in the door to the approach to a more peaceful world. But we are not there yet. Even assuming the best in the carrying out of this agreement, we have made a beginning, and a beginning only, in what we can expect at best to be a long road.

In the second place, we must recognize that although this agreement has been made, and while this is good news, these are not automatically self-executing agreements. Both sides must now demonstrate their good faith in carrying them out. There is a particular opportunity on the American side for this demonstration, for under our Constitution the Government could not bind the actions of the citizens. Therefore, our performance will be a demonstration of both the good will and the good faith of a free people.

But in the third place, while we must be conservative in our evaluation and expectations, by no means should we discount the significance of this step. Barring accidents, we will have achieved some lowering of the barriers to communication between us. We have established precedents which we hope will be of great use, both as to method and the fact of agreement itself; and we hope to gain useful experience in the carrying out of these terms.

And now we come to the fourth question, the most important one. Where does the road lead now? What are the next steps? What can we hope for soon?

Some of you may be picking up your pencils.

But this is more properly a question for others to answer than for me. I have already identified the role of the diplomat. We are carpenters on the policy framework, not the architect. Ultimately, the sovereign must be the architect of policy, and in this Nation the people are sovereign. The executive branch and Congress are their chosen representatives. Their leaders must speak.

So, to review its political implications, this agreement is limited in scope to a single field—exchange—and still in process of being carried out. It is a beginning, in the work of bridging the gap between East and West. As to where it will lead us, and when and how, it would be both misleading and unproductive for me to attempt officially to speculate.

IV

Now, let us turn to the question of how it was possible for such an agreement to come to be at all. What factors came to bear, and what, if any, lessons can we learn from them?

In attempting to identify the causes of an event in history, it is well to bear in mind what Sir Harold Nicolson called the danger of mistaking actual values, of attributing to circumstances which seem significant an importance which they do not in fact possess, of underrating other circumstances, apparently trivial, which at the time acted as determinant factors.

To the extent that it is given to us to know them, however, these are some of the chief factors which might be listed as making the exchange agreement possible.

The press

It is appropriate to start with the press, not just because we meet in the press club, but because you did play a vital part. Someone remarked the other day that we had used up most of our credit with you in begging you to let us negotiate quietly until an agreement could actually be signed. Premature publicity might well have spoiled it all. Professionally and personally we are all grateful. Your cooperation was a service to your country as well as a credit to our profession.

If the press has played its part in helping to bring this agreement into being, it now has a further role to play in helping the Nation to understand it, and its implications. The fact that the negotiations were private does not mean that any of the provisions are secret. That is the reason why we of the State Department welcome this opportunity to discuss it with you here today.

The delegation

If the signing of this agreement might have been beyond us without your help, it certainly could not have come to be without the quality and dedication of the delegation which supported the negotiations. In many ways it is easier to head a mission or delegation than to play a skillful supporting role. It is true that the senior member bears more responsibility. But there is always excitement and reward in having some power of decision, a freedom and sense of perspective. Those who do the supporting, however, know more of the grief and burden of the job, and less about its pleasures.

The administration

If negotiation depends for success upon cooperation from the press and support from an effective and devoted delegation, so it must have guidance and support from those who give shape and direction to our foreign policy, and from these policies themselves. There is no need to remind you that these negotiations could only have been conducted under the specific instructions of Secretary Dulles, who had skill in these matters before some of those participating were born. Furthermore, if success came within the realm of possibility at all, it was because the United States, by its actions and policies, has convinced the world that while we do seek peace, we will neither lower our guard nor sell out cheap to gain a settlement. This is the architecture without which the patient carpentry of diplomacy could not hope to function.

The Congress

Since the sovereign people are represented by both the Executive and the Congress, a negotiation such as we conducted cannot be carried on without consultation with the appropriate congressional committees. It would be difficult if not impossible to carry through successfully without their support. We had their support. We had their advice. We received the benefit of their patience, and their silence. They, too, played their part, and play it well.

The Soviet Union

And just as the negotiations on our side depended upon hard work, cooperation, and a combination of good will and firmness, so they required across the table a willingness to agree if a basis could be found, and the capacity to find a practical means of carrying out that will.

As I have mentioned, we did not get all we wanted in that agreement, nor did the Soviets achieve all they desired. We bargained hard. As Secretary Dulles told you last month, "Whenever negotiations involve matters of real substance, the Communists go at them in a tough, hard way * * * They practice inexhaustible patience * * * They astutely take into account any weakness of their opponents such as impatience to get the negotiations over * * *."

Recently there has been dramatized before the world the fact that Soviet scientists and engineers rank with any in the world in skill and knowledge. Their diplomats are not less capable, and we had better not forget it, in our haste to train more engineers. Yet the fact that we could come together to bargain at all, and the fact that the bargaining did result in an agreement, indicates, we hope and trust, that the Soviets are coming to recognize that some bridging of the gap between us is both necessary and possible.

If we are to list fully the influences which helped this negotiation achieve any degree of success, I would personally suggest that we include one more, the Almighty. I am aware, of course, that this platform is not ordinarily employed for the holding of prayer meetings. But in the interest of what you would call "full reporting," I must say to you that I went into this meeting with the feeling that reliance on human power and human wisdom alone would at best have been foolhardy, and at worst tragic. I am not ashamed to say to you, furthermore, that I did ask for guidance, and I did ask for strength. I suspect I was not alone, and it is *my* conviction that when we needed those things they were there.

V

There has been, as you know, some public comment that these talks have demonstrated that there is still a useful place in the world for old-fashioned classical diplomacy.

Classical diplomacy has been under a cloud now during most of your lifetime and mine. Immediately after the First World War there was an extremely strong public reaction to the revelation of secret treaties whose very existence had been

previously unknown. Diplomacy then became equated in the public mind with secret covenants secretly arrived at. During these years there has been a similar equation of diplomats with party goers who went about their business with no regard for the ways or the wishes of the people they were supposed to represent.

Actually, what is diplomacy? The Oxford English dictionary says "Diplomacy is the management of international relations by negotiation; the method by which these relations are adjusted and managed by ambassadors and envoys." A great authority, Sir Ernest Satow, defined diplomacy as "the application of intelligence and tact to the conduct of official relations between the governments of independent states." However, I have always been more fond of a definition of Harold Nicolson's because in this definition he has made the supremely important distinction of saying what diplomacy is not. In the early pages of one of his books Mr. Nicolson says: "The words 'diplomacy' and 'diplomatic' will be used to designate neither foreign policy nor international law, but the art of negotiation."

There were present in these negotiations, as there always are at some stage of the practice of old-fashioned diplomacy, two essentials. The first of these was privacy. Anyone who successfully handles affairs of any sort learns quickly that all business cannot be transacted in the middle of Main Street at high noon. Few if any major industrial mergers are consummated without at some point a quiet, man-to-man, straight-talking session, where final differences are resolved, and rough edges removed. Governing bodies, be they city councils or committees of Congress, find it necessary from time to time to go into executive session, either to get to the bottom of some delicate matter, or simply to discuss what to do next, without opening themselves to pressure to take one course or another. You of the press know well enough that we are able sometimes to give you on an "off the record" or "not for attribution" basis what we would be simply unable to give you for attribution.

Any of these employments of privacy may be abused, just as any means of publicity may be abused, but this does not mean that either privacy or publicity are evil things in themselves. And if privacy is necessary for discussing matters of business or government within nations, it is wholly indispensable for discussing matters between nations, especially at a time when any difference standing between us has in it the potential of our preservation or destruction.

The second essential to the success of this negotiation was that it was from our side a step-by-step affair. The approach of diplomacy varies with the nature and difficulty of the problem faced, of course, much as the approach of a mountain climber would vary with the type of slope he wishes to climb. But with an agreement difficult of achievement, as with a rock face difficult to climb, a realist must as a rule make his beginning at whatever point offers the least difficulty and the most promise, and then must work, his way ahead, step by patient laborious step. If he approaches the matter carelessly or hastily, if he tries to skip any important steps, he at best will fail to reach his goal, and at worst may have a bad fall.

We opened our side of the negotiations with a very simple, limited proposal, the proposal for radio and television exchanges. At that time voices were raised to say we were not proposing enough. But with patience and effort, and with continuous negotiation, an agreement was hammered out to cover that point and a great many others as well.

And just as one proposal can provide the seed of an agreement, so we can hope that one agreement can help eventually to pave the way for other, broader discussions, on a meaningful and realistic basis.

VI

We needed support at home and willingness abroad. We needed the privacy and the orderly methods of so-called classical diplomacy, if this agreement was to come to be. In addition, we needed patience, not only in getting through the negotiations, but in getting to them. This is perhaps the most important lesson of all to be learned from these negotiations. This bilateral agreement marks a new stage in negotiations between the two countries.

As we face dealings with the Soviet Union, we must be prepared if necessary and our people must be prepared, to live through a generation, 2 generations, 10 generations, with no further progress toward a settlement between us. Indeed, the more willing and able we are to wait, the less waiting in the long run we will be required to do. Our opponent is skilled at knowing the limits of our

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patience. If he comes to see that he cannot exhaust them, he will be less tempted to try. He is a realist.

And just as we must be capable of waiting as long as waiting may be required, so we must be prepared to make another attempt at negotiating whenever a legitimate meaningful opportunity presents itself. If necessary, we must be able to make a hopeful beginning a thousand times, and be disappointed a thousand times, and still be ready to try again.

But as we must be hopeful, so we must be cautious. There is a wide difference between legitimate negotiation conducted in an effort to reach an agreement, and a negotiation conducted for other reasons. Any trader whether in stocks or bonds, or horses or mules, can testify to that. Negotiation can be used for delay, for deception, for dividing friends, for discouraging and disheartening populations. We must separate the wheat from the chaff in these matters, for there is more grief than profit in threshing straw.

And one final thought on this matter of patience: Once any negotiation may be entered, we must recognize that a bad agreement could be worse than no agreement, in weakening our alliances, in compromising our defensive position, in creating false confidence or disillusion. It is too easy, when talk has dragged on long and fruitlessly, to be overeager to end it with some agreement, any agreement. But remember, the Austrian Treaty took 8 years of negotiation, involving 400 meetings. Again to quote Secretary Dulles' remarks to you last month, "We must, on the basis of past experience, assume that negotiation with the Communists, if it is to bring acceptable results, will be a long, hard task."

So if the first lesson of this agreement is that old-fashioned diplomacy, high-level horse trading if you like, can pay off, the second lesson is that it will pay off only if employed with enduring patience. This patience includes the willingness to wait, the capacity to continue to hope and try again, the caution to avoid false and dangerous approaches, and the restraint to refrain from agreement until a meaningful agreement is to be reached.

This is perhaps a grim picture. This Nation broke its frontiers, and built its industrial might, not so much through patience as through impatience. Buffalo Bill, Horatio Alger, either one, always had to be pushing ahead. But we were a young land then, and impatience is a luxury youth can indulge. We have occupied this position we hold in the world for less than half a generation. It is a position for which maturity is the first and most essential trait, and patience is the sine qua non of the sort of maturity we need.

I do not say impatience is entirely out of date. But nowadays it must be curbed with a firm, well-guided discipline.

VII

Before I close let me touch one further aspect of these negotiations for international exchange. By the fact of negotiating itself we were conducting an exchange of sorts. I have already told you that Ambassador Zaroubin and colleagues were tough bargainers, formidable negotiators, and that neither side won all it wanted. But for all the battle of wits, no one irretrievably lost his temper, and certainly we learned a mutual respect.

And for all the restraints necessarily imposed upon us by our positions, it was inescapable that we should come to see each other not merely as representatives, or as forces, but as people—human beings. I entertained the Soviet delegation and was entertained by them. May I say that Ambassador Zaroubin was a good guest and a good host.

We served opposing interests, but we were also serving, each according to his lights, the common cause of humanity's search for peace. I hope and trust that through the agreement we signed may occur thousands of exchanges, from college wrestling teams to literary delegations, which will share some of the personal, face-to-face dealing and contact we experienced, for I heartily concur with the view of Mr. Dulles that such contact is "a curative and creative force" in world affairs. It is a force which ultimately can bring the peace both peoples desire.

(The chairman subsequently ordered the following address by Allen W. Dulles, Director, Central Intelligence Agency, given at the 46th annual meeting of the United States Chamber of Commerce, held in Washington, D. C., on April 28, 1958, to be printed in the record:)

ADDRESS BY ALLEN W. DULLES, DIRECTOR, CIA, TO THE 46TH ANNUAL MEETING OF THE CHAMBER OF COMMERCE OF THE UNITED STATES

KHRUSHCHEV'S CHALLENGE

The subject for your meeting today, "Dimensions of the International Peril Facing Us," is a particularly appropriate one for the Chamber of Commerce of the United States. With its membership of 2½ million businessmen, your organization occupies a key position of influence in our Nation's approach to international as well as domestic problems.

It is also a timely subject for you to be considering. Today the Soviet Union, through its very vocal leader, Khrushchev, is directly challenging the United States in the fields of industrial development and foreign trade and aid as well as in military matters. The other day he remarked, "To the slogan that says, 'let us arm,' we reply with the slogan, 'let us trade.' "

The economic challenge is a dual one. They are setting goals for their own domestic production to compete directly with our own and to quote their words, "to get ahead of us in the economic race." The other phase of their challenge is through their foreign economic penetration program.

I shall discuss both of these challenges. But before doing so, I shall analyze briefly the development of Soviet policy over recent years, as this, I feel, helps to explain why they have turned to the economic and industrial fields to promote their long-range international policies.

In the immediate postwar period, Stalin relied on military and paramilitary action and the military threat as the chief weapons for the advancement of Soviet aims.

It was with military force that the Soviet took over and established their control in the European satellites and repressed the democratic forms of government which tried to find root immediately after the war. It is with military occupation force and the threat of force that they still hold their position in central Europe.

Then in Iran, in Greece, and at Berlin in the early postwar years, it was force and the threat of force that was used in the attempt to break down the free-world defenses. Through the Marshall plan and our growing military preparedness following Korea, this threat was contained in the West; but China was overrun by the Communists and northern Vietnam taken.

These and other military and subversive maneuvers alerted the free world to the dangers of Stalin's policies. Our countermeasures tended to make them counterproductive. Stalin was posthumously discredited by Khrushchev. Stalin's programs were generally repudiated by his successors who literally trembled at the risks he had taken at a time when the Soviet had no atomic capability to match our own. It is well, however, that Khrushchev's ruthless repression of liberty in Hungary with Soviet troops should stand as a reminder to us that Stalinist tactics may at any time be revived if the Soviet Union feels its vital interests are affected.

Today we face the subtler policies of Nikita Khrushchev. Will they be more or less effective than the Stalin policies in achieving the overall aims of international communism?

Of course, I do not mean to discount the seriousness of the Soviet military threat or its challenge in the scientific and technical fields on which advanced weapons systems depend. But as I see it, under its present policies, the U. S. S. R. does not intend to use its military power in such a way as to risk general war. They have a healthy respect for our retaliatory capability.

Furthermore, the Soviet success with sputniks and in the field of ballistic missiles has well alerted us to the military danger and our missile and other

programs are receiving top priorities. We must, however, be ever watchful of the Soviet emphasis on the military applications of science and technology in order to anticipate any attempts at a breakthrough which would change the balance of military power.

Barring such a possibility, it is most probable that the fateful battles of the cold war will, in the foreseeable future, be fought in the economic and subversive arenas.

To understand the seriousness of the Soviet economic threat, it is essential to understand the Soviet economic and industrial base on which they are developing their economic penetration program.

Since 1928, the Soviet Union has developed rapidly from a predominantly agricultural and industrially underdeveloped country to the second largest economy in the world. Forced draft industrialization, emphasizing heavy industry, was carried out by Stalin to prevent, to quote his words, "another beating of backward Russia by the more economically advanced capitalist countries." Forced draft industrialization continues in Russia today, and now the emphasis is more positive; namely, to meet Khrushchev's goal of, "catching up and surpassing the United States in per capita production within the shortest possible historical period of time." This theme is being used not only as internal propaganda but also to propagate the Soviet faith abroad.

Comparison of the economies of the United States and the U. S. S. R. in terms of total production of goods and services indicates the U. S. S. R.'s rapid progress. Whereas Soviet gross national product was about 33 percent that of the United States in 1950, by 1956 it had increased to about 40 percent, and by 1962 it may be about 50 percent of our own. This means that the Soviet economy has been growing, and is expected to continue to grow through 1962, at a rate roughly twice that of the economy of the United States. Annual growth overall has been running between 6 and 7 percent, annual growth of industry between 10 and 12 percent.

These rates of growth are exceedingly high. They have rarely been matched in other states except during limited periods of postwar rebuilding.

A dollar comparison of U. S. S. R. and United States gross national product in 1956 reveals that consumption—or what the Soviet consumer received—was less than half of total production. It was over two-thirds of the total in the United States. Investment, on the other hand, as a proportion of gross national product in the U. S. S. R., was significantly higher than in the United States. Furthermore, investment funds in the U. S. S. R. were plowed back primarily into expansion of electric power, the metallurgical base, and into the producer goods industries. In these fields, it was over 80 percent of actual United States investment in 1956, and in 1958, will probably exceed our own. Defense expenditures, as a proportion of gross national product in the U. S. S. R., were significantly higher than in the United States; in fact about double.

Soviet industrial production in 1956 was about 40 percent as large as that of the United States. However, Soviet heavy industry was proportionately larger than this overall average, and in some instances the output of specific industries already approached that of the United States. Output of coal in the U. S. S. R. was about 70 percent of that of the United States, output of machine tools about double our own, and steel output about half.

Since 1956, Soviet output has continued its rapid expansion. In the first quarter of 1958, Soviet industrial production was 11 percent higher than a yeaf ago. In comparison, the Federal Reserve Board index shows a decline of 11 percent in the United States.

According to available statistics, in the first quarter of 1958, the Sino-Soviet bloc has for the first time surpassed the United States in steel production. The 3 months' figures show that the U. S. S. R., alone turned out over 75 percent of the steel tonnage of the United States.

A recession is an expensive luxury. Its effects are not confined to our own shores. Soviet propagandists have had a field day in recent months, pounding away at American free enterprise.

Every Soviet speech, magazine article, or radio broadcast beamed to the underdeveloped nations plays up and exaggerates our economic difficulties. The uncommitted millions are being told by the Communists—"see, we told you so. Crises and unemployment are inevitable under capitalism. Communism is the only true road to social progress." Our economy is giving the Communists a propaganda target as damaging, and, I trust, as transitory as their own sputniks.

Continued Soviet industrial growth has had a counterpart in increased trade with the free world. Over the past 2 years, their trade with the West has been

moving ahead far more rapidly than it has within the bloc itself . About 70 percent of the U. S. S. R.'s increase in nonbloc trade in 1957 was with the industrial nations of Western Europe and, under agreements such as that just concluded with Germany, will expand still more.

Recent speeches by Soviet leaders—Khrushchev, Mikoyan, and Deputy Foreign Minister Zahkarov—stress the U. S. S. R.'s desire to expand trade with the free world. Mikoyan, for example, said that the U. S. S. R. is "confident that with the establishment of normal trade relations a significant forward step will be taken along the road leading to the establishment of cooperative relations between the Soviet Union and the United States." This month, Zahkarov told the United Nations' Economic Commission for Europe that western trade ministers should devote their energies to bringing about a long-run increase in East-West trade.

Soviet capabilities to export petroleum and metals—aluminum, tin, zinc, and ferroalloys—is increasing. The U. S. S. R. is already a supplier in a few traditional western metal markets. Over the years, the U. S. S. R. may well become a major source of many such industrial necessities to Western Europe.

This seems particularly likely if Khrushchev's 1972 commodity goals prove to be realistic.

Take, for example, petroleum. By 1972, the Soviets plan to produce as much crude oil as we in the United States do today. Even allowing for substantial increases in domestic consumption, they could export about 2 million barrels a day. Today, all of Western Europe consumes about 3 million barrels a day.

A start has already been made on the pipeline needed to bring the crude oil from the Ural-Volga Basin to the Baltic.

Soviet ability to use trade as a weapon to advance its political aims will increase in a direct ratio to their success in realizing their economic goals.

For example, once they have penetrated western European markets to the extent that these markets become substantially dependent on Soviet industrial raw materials, they will have available a new and formidable weapon of economic warfare. By withholding supplies, by capriciously raising prices, or by dumping commodities, the Soviets in effect will have a seat at the council table of the great industrial nations of Europe.

During the Suez Canal crisis, we saw a brief glimpse of Soviet capabilities to grant or withhold economic favors through the forms of its own petroleum exports. The increase in sales of metals and petroleum to free world countries, which moved sharply upward in 1958, is not an economic flash in the pan. It is a reflection of growing Soviet industrial capacity.

Further, their governmental setup is well adapted to waging economic as well as political warfare. They have no budgetary controls when it comes to diverting funds to particularly urgent national policies. There need be no prior consultations with parliaments or the people.

This, briefly described, is the Soviet economic base and foreign trade program, as we analyze it today. It is to this base that Moscow is adding its foreign economic penetration deals designed to wean to its camp the uncommitted and newly developing areas of the world.

It is important at the outset to note that Soviet credits and grants are not limited to those countries where there is an early prospect of acceptance of Communist doctrine.

Of the $2 billion of development and military air extended by the Sino-Soviet bloc over the past 3 years—and this is exclusive of intrabloc aid which is a substantial drain on Soviet economy—large sums have gone to countries which are not now in the Soviet camp.

Let us get down to cases: In Egypt the Communist Party was outlawed at the time of the bloc's original military aid offers in 1955. Despite repeated crackdowns on Communist elements within the country since that time the U. S. S. R. concluded a major $175 million economic aid program with Egypt in 1957.

Communist influence in Syria has been reduced following its membership in the United Arab Republic in February of this year—even to the point where Khalid Bakdash, the leading Arab Communist, fled the country. But the U. S. S. R. is going ahead with its $170 million economic aid program and continues to supply arms under agreements worth $100 million. The magnitude of this and other military programs raises the question as to who may be the eventual user of these arms.

The list of examples can be extended. Afghanistan is a monarchy. The Imam of Yemen is an absolute ruler. Both are recipients of large Soviet aid programs.

Soviet bloc economic penetration of Yemen provides a striking instance of the use of trade and aid as an investment in disorder.

Yemen is strategically located at the entrance to the Red Sea from the Gulf of Aden. It commands one entrance to all Suez Canal traffic; the oil moving westward as well as goods moving from Europe to the East.

Soviet overtures were appealing to the Imam because the bloc was willing to supply him with arms, while the West would not. Arms in Yemini hands on the scale contemplated can only create more trouble in the Middle East. They will fan the Imam's dispute with the British and with local sultanates over the borders of the Aden protectorate.

The Soviets were quick to sense the opportunity to create disorder by giving aid to Yemen. They moved quickly. In less than 2 years, this small country of some 4 millions of people has been granted $80 million in credits. Additional offers of over $20 million are currently outstanding. Arms valued at $30 million have been delivered. A Soviet and Czech military mission of some 65 advisers is currently in Yemen for training assistance.

Even the Red Chinese have joined in with an offer of a loan of $15 million. If all proposed projects are carried out, the Communists will play a key role in Yemen's economic as well as military development.

The Communists have no interest rate problems. They have no legislative restrictions. The U. S. S. R. has developed an attractive package credit deal—long-term loans, generally for 12 years; 2½ percent interest rates; repayment in surplus commodities, and room for bargaining on prices. They have devoted much effort to the native language training of the technicians they send with their aid to the newly developing nations.

Though the Communists eschew capitalist types of business organizations in their own country, they make liberal use of them abroad.

One of the most important of these is the Bank of China. It is a primary source of funds to the 12 million Chinese in southeast Asia. These loans, controlled from Peiping, often require appropriate gestures of support to the Communist regime in China.

Branches of the bank throughout the East promote the export and sale of Chinese Communist goods in the area. They also collect a vast store of economic and political information, both openly and by clandestine means.

In Paris, for its European business, the Soviet use a commercial bank called the Banque Commerciale pour l' Europe du Nord. It often serves as agent for effecting sales of Soviet gold in London and on the Continent and is the means through which Soviet credits are transferred to the satellites. It also maintains a widespread system of correspondent relationships with banking institutions throughout Europe and in this hemisphere and is one of the chief instruments for the financing of Soviet trade with the West and for obtaining information on trade opportunities.

In Latin America, there are a number of Communist-front or bloc-associated organizations actively campaigning for closer commercial ties with the bloc. In Brazil, one of these has been offering to import and sell Russian automobiles at ridiculously low prices. When this fell through, it offered to import a complete auto factory from the U. S. S. R. While neither offer may have been serious, they had considerable propaganda value.

On a worldwide basis, the Soviet Union presents itself as eager to do business on terms attractive to the customer.

Moscow's foreign aid program has particular appeal in the undeveloped countries because Russia until so recently was an undeveloped country itself. For some reason the recently liberated countries seem to feel that the Kremlin has found a new and magic formula for quick industrialization which is the hallmark of becoming a modern state to many of these countries. They recognize American economic and industrial leadership in the world but they feel that the democratic process of economic development may be too slow.

Soviet propaganda charges that it took the West 150 years to achieve industrially what the Soviets have built in a generation. In the newly developing countries, the drive for economic betterment has become a crusade, not always based on reason.

Also, these countries feel that we in the United States are far ahead of them and that while they may aspire eventually to an economy something like that of the Soviet Union, they cannot, in the foreseeable future, hope to reach the high standards of living of this country.

Factors such as these give a particular appeal to overtures from the Soviet Union. They are not able to see the invisible strings wihch are tied in with

Soviet offers nor do they understand the subtle implications of Soviet subversive penetration which is a part of every economic package.

Each time that I prepare a summary of any phase of Soviet activities, whether it be in their domestic industrial development, their foreign economic exploitation activities, or their military defense preparations, I am impressed by the efforts which the Soviet make to keep secret the details of their operations.

If their motives in the military, industrial, and economic fields are, as they claim, peaceful and defensive, why should this be the case? Why are we not entitled, before we accept their protestations regarding peaceful coexistence, to ask that there should be a franker disclosure of their activities—something comparable to the disclosure made by the free countries of the world?

For example, before their recent offer of a suspension of nuclear testing, they themselves had just completed a series of nuclear tests, concentrating a great number of tests in a short period of time. For example, three tests occurred within a single 2-day period in an unprecedented burst of activity. This was done behind a cover of secrecy except for announcements that our Government itself made of the Soviet tests. But, by and large, their activities in nuclear testing remain quite unknown particularly in those countries which are being filled with Soviet propaganda against testing.

The nature of their military aid programs such as I have described above have, by and large, been kept as secret as the Soviet could manage. An even tighter veil of secrecy is kept around almost all phases of their military establishment.

The details of our own aid programs as well as of defense expenditures and military production, with few exceptions, are available to the world through our newspapers. In contrast, the Soviets release only the annual ruble total of what they call defense spending.

It is our best estimate that the announced Soviet defense budget as published to the world actually covers little more than half of the rubles they are now putting into military activities.

As long as this secrecy remains a cardinal tenet of Soviet practice it is extremely difficult to accept Soviet protestations of a desire for peaceful relations as expressing their real intentions.

It is true, and it is an encouraging sign, that exchanges of visits are being arranged, particularly in the cultural, technical, and academic fields. This may well help to a better mutual understanding but that understanding will be very incomplete until it is broadened to a point where the barriers of secrecy are removed. It is this very secrecy which makes meaningful agreements so difficult to reach.

One answer to Khrushchev's challenge to us should be a renewed challenge to them, as in the President's open-sky proposal, to put an end to secrecy which breeds suspicion and doubt.

Undoubtedly, one of the reasons for secrecy is to hide from the world some of the problems which the Soviet Union faces.

In the analysis I have given above, I have stressed their very real achievements, their growing power, and their rapid rate of progress. These factors we must not underestimate. However, the realization of many of the goals they have set depends on resolving some very real obstacles to success.

For example, Khrushchev has repeatedly promised his people startling improvements in the quality of their diet. The realization of these dreams rests on a precarious agricultural base, whose crops over large areas, as we saw in 1957, are vulnerable to serious drought. Further, Khrushchev has brought the anti-geneticist Lysenko back into favor, a theorist whose plant and animal breeding ideas are regarded as nonsense by all competent Western scientists.

They are now engaged in a massive reorganization of the control of their industry and this move toward decentralization has built-in, long-run dangers for any dictatorship such as that of the Kremlin today.

The myth of collective leadership has been abandoned and there are signs today of a reversal to a harsher line with consequences of a far-reaching nature. Khrushchev, despite his gregarious characteristics, as he assumes new positions of power and eliminates his rivals, becomes more and more an isolated and lonely figure.

As they enter into the field of international trade on a major scale they lack a convertible currency. They must rely on the device of settling international balances in sterling or dollars. In essence, most of their trade must remain on something approaching a barter basis. The ruble is not an international currency and within wide ranges its value is a matter of speculation, varying from

the official rate of around 20 cents to a purchasing value of around 10 cents, to a quoted value for ruble notes in the Swiss market of only a few cents. But, of course, this latter rate is due to the fact that ruble currency can neither be legally imported into nor exported from the Soviet Union.

Possibly today the most acute problem facing Khrushchev is that of meeting the growing demands of the Russian consumer for a greater share in the overall production of the Soviet Union. With a gross national product of around 40 percent of our own, they put into the military sector a national effort roughly comparable to our own, leaving only a modest share for consumer goods.

If the Kremlin responds to popular pressures, they will be forced to give more and more to the consumer. This trend has already started. The Russians have somewhat improved living standards and the national output of such consumer goods as TV sets and washing machines has been stepped up. Some former armament plants are now producing civilian goods.

All this may help to develop a society where people will have more opportunity to satisfy the individual yearning for a fuller life. Economic betterment, added to the massive educational system they have already installed, may help to build up generations of people more and more inclined to question the basic tenets of a totalitarian philosophy and less willing to tolerate the autocratic forms of government under which they are living.

Under Khrushchev there has been, undoubtedly, some relaxations of the old Stalinist police system, but every 2 steps in advance seem to be followed by 1 step backward as they wrestle with the problem of reconciling a measure of freedom with the stern line of Communist doctrine and discipline.

The fact that the leadership of the U. S. S. R. faces these very real problems is, however, no excuse whatever for complacency on our part. During and since the war, their leadership has faced even more serious problems and has surmounted them. The economy of the Soviet Union has momentum and versatility and, while I predict that their people will undoubtedly press for an improvement of their lot, some real concessions can be made to them without fundamentally altering the general tempo of their present industrial and military programs.

Certainly here we have the most serious challenge this country has ever faced in time of peace. As this challenge is very largely based on the economic and industrial growth of the Soviet Union, it is one which concerns very directly the business leaders in our country.

(The following exhibit was submitted by Senator Watkins:)

EXCERPTS FROM SOVIET ECONOMIC GROWTH: A COMPARISON WITH THE UNITED STATES

A STUDY PREPARED FOR THE SUBCOMMITTEE ON FOREIGN ECONOMIC POLICY OF THE JOINT ECONOMIC COMMITTEE BY THE LEGISLATIVE REFERENCE SERVICE OF THE LIBRARY OF CONGRESS

LETTERS OF TRANSMITTAL

JULY 5, 1957.

To Members of the Joint Economic Committee:

The enclosed material forwarded to you is explained by its opening letters.

WRIGHT PATMAN,
Chairman, Joint Economic Committee.

JUNE 28, 1957.

Hon. WRIGHT PATMAN,
Chairman, Joint Economic Committee,
United States House of Representatives,
Washington, D. C.

DEAR MR. PATMAN: In its report to the Congress of March 1, 1956 (S. Rept. 1606, 84th Cong., 2d sess.), the committee stated the Foreign Economic Policy Subcommittee "* * * during the coming year will continue its studies of: (1) Current economic trends behind the Iron and Bamboo Curtains, in the free world, and in the uncommitted regions of the world; * * *." Part of this work and the other directives to the subcommittee were met by public hearings in December 1956. The committee staff also was directed to undertake a study of economic

trends in support of this program. This study is forwarded in compliance with that mandate.

I commend to your attention the enclosed material which throws light on the problems of comparative economic growth in the Soviet Union and the United States. It is understood, of course, that this study does not necessarily represent the views of the committee or any of its individual members. The cooperation of the Legislative Reference Service of the Library of Congress with this committee is greatly appreciated.

RICHARD BOLLING,
Chairman, Subcommittee on Foreign Economic Policy.

MAY 29, 1957.

Hon. RICHARD BOLLING,
Chairman, Subcommittee on Foreign Economic Policy,
United States House of Representatives,
Washington, D. C.

DEAR MR. BOLLING: More than 2 years ago the Joint Economic Committee sponsored a study conducted by the Legislative Reference Service of the Library of Congress entitled "Trends in Economic Growth: A Comparison of the Western Powers and the Soviet Bloc." That study represented a notable assembly and analysis of the best available data for comparing both the status and the growth trends of the economies of the Soviet Union and its European captive countries on the one hand and of the United States and the associated states of Western Europe on the other hand.

With each month bringing startling new developments in the Soviet Union, the latest being the Khrushchev regionalization plan, it is important to have a current study to examine the economic setting in which these changes are occurring. Much has transpired since the time of the previous study to make important a fresh look at trends in economic growth, including both the apparent shifts in Soviet foreign economic policy and the new availability of data on the Soviet economy beginning in 1956. As to the first point, even though it remains a relatively closed system, the Soviet Union has offered technological aid and capital goods to quite a number of underdeveloped countries, and has bid for expanded trade with almost all nations that might be interested. Although a study such as this cannot read Soviet intentions to carry through such programs, it can explore the character of the economic support base on which the Russians might depend in such endeavors. The second point, relating to the new availability of data, is a recognition that quite recently the Soviet Government has become a little less secretive about economic data, and now has published for the first time in nearly two decades absolute data in a new statistical abstract on the Soviet economy entitled "Narodnoe Khoziaistvo SSSR." It has been followed by four other important volumes—those on Cultural Construction, Trade, Industry, and the Russian S. F. S. R. Within the limitations described in the first chapter of our new study, great advantage to economic analysts has accrued from the release of the several handbooks.

The present study is more selective than the previous report prepared for the Joint Economic Committee. It focuses its attention on key aspects of the Soviet economy, and uses the United States as a yardstick. This particular comparison was selected because these are the two industrial powers of the world whose relative development is most closely watched by all others. By keeping the exposition bilateral, the complexities of all comparisons at least are a little more manageable than would be one involving many nations. Political changes reduce the usefulness of any simple additions of economic strength into a Communist bloc and a free world bloc, or some lesser division of associated non-Communist states. This is true whether the purpose is trade potential or military potential. It would have been particularly interesting to go beyond the previous study made for the Joint Economic Committee to study the growth of Japan, India, and Red China, for example. But it seems premature to attempt a quantitative assessment of Red Chinese development when the Bamboo Curtain so effectively obscures any real check on the statistics provided by the regime which our Government does not recognize.

This study is limited in another respect. It has tried to concern itself with economic description of the sort persons in some third country might write about the two major economies. It is not a treatise on political organization, police-state terror, sociology, or psychological warfare. As Americans, we share a set of moral, social, and political values which make us abhor the particular

route to economic development which the Soviet Government has pursued. The absence in this study of full discussion of the human suffering which has accompanied the growth of Communist power does not mean that it should be overlooked, but such discussion has not been the goal of this exposition. Our thesis, simply stated, is that on purely economic grounds the Soviet system has developed in a way which would be considered very unsatisfactory by our standards, and, we believe, unsatisfactory for the people of the Soviet Union as well as for the captive nations within the Communist orbit. As the same time it is important to recognize the dimensions of the Soviet threat as measured by their ability to produce military hardware and to produce industrial goods which might support their programs of trade penetration and technical assistance around the world, and this is more the concern of this study.

Any study made of an economy is faced with problems of balance in its presentation of facts. The problems are multiplied manyfold when two different economies must be compared, as is developed in this study. The first draft of this study was intended to be as close to the middle of the road in its judgments as was possible. On completion it was widely circulated among cognizant agencies of the executive branch of the Government and to leading private specialists in Soviet economic studies. As their comments flowed back in large volume, it was apparent that it is almost impossible to write a report which steers clear of interpretational controversies which rage among the best experts. This report, as revised, continues to try for a middle course, but now reflects either in text or footnotes ranges of opinion where qualified people disagree. It would be ideal if it were possible to give black and white contrasts of the two economies, but conceptual difficulties as well as inadequate data rule this out. Therefore, it must be understood that if one is to attempt a broad international comparison at all, the results can be regarded as only approximate. The study has attempted to state its assumptions, to qualify, to suggest further sources of information, and to discuss the problems of particular comparisons. Overall, the analysis appears to be sufficiently comprehensive and accurate in its implications to meet the purposes outlined in the beginning of the first chapter.

Because the availability of data keeps changing, construction of estimates based on indirect evidence is always improving, and the economies themselves are always evolving, these results should be considered provisional and partial. With additional time, staff, and facilities, a more comprehensive book could be prepared. This was designed deliberately to highlight major comparisons for general use, not to provide encyclopedic coverage with a great mass of supporting technical detail and calculation. Even so, the notes accompanying the tables tend to be lengthy because of the complexity of the data. Nor does the study involve much original research. It is a compilation and review of information obtained largely from published sources. But at the same time, the synthesis of these materials should answer many questions.

This study is but one part of the activities undertaken by the Joint Economic Committee on problems related to world economic growth and competition. Building on the foundation of the Report on Foreign Economic Policy issued on January 5, 1956, as Senate Report 1312, the Subcommittee on Foreign Economic Policy held hearings on Defense Essentiality and Foreign Economic Policy in June 1956. One part of that review explored the nature of modern war and its mobilization implications for national strategy, an important step supporting the analysis of this present study. Then in September and October 1956, I traveled to Bangkok, Thailand, as the United States delegate to the working party meeting of the Economic Commission for Asia and the Far East, to study the problems of economic development. On the way there, it was possible to travel by way of Moscow, Tashkent, Kabul, and New Delhi. This afforded some unusual opportunities to interview top Soviet economists on a range of economic policy concepts, and to meet with directors of India's economic-development projects. Finally, in December 1956, the Subcommittee on Foreign Economic Policy met again for 3 days of hearings on world economic growth and competition, at which time leading experts on United States and on foreign economic growth analysis were heard on comparisons of growth in the industrial nations, in the underdeveloped regions, and to explore the implications for United States policy. These hearings were helpful to firming the conclusions contained in this study. The printed record of the December meetings also contains on pages 170–175 a commentary on the trip to the Soviet Union referred to above. (A reprint of an article entitled "Kremlin Economists Disclose Red Plans," which appeared in Nations Business in January 1957, p. 25 and following.)

Throughout the past 2 years Dr. Charles S. Sheldon II, senior specialist of the Legislative Reference Service of the Library of Congress, has served as the staff economist for the Subcommittee on Foreign Economic Policy, and it is under his immediate direction and supervision that this study has been organized and carried out. The original work on this study was done by Mr. A. David Redding who was attached to the Legislative Reference Service specifically for this purpose.

In preparing this report Dr. Sheldon and Mr. Redding have had the benefit of detailed reviews and comments by individual specialists in the Department of Agriculture, Commerce, Defense, Labor and State and the Library of Congress. Valuable comments have been received from reviewers in universities and in private research organizations. Altogether, over 40 authorities with special competence in one or more of the fields covered by this report gave generously of their time and talent at various phases in the development of the study. Some have chosen for institutional reasons that we not acknowledge their help specifically. In any event no outside reviewer can be held responsible for the use made of their suggestions in the final preparation of the study. We are deeply grateful for their assistance.

Among the persons consulted were: Gertrude Bancroft, coordinator for manpower statistics, Bureau of the Census; Abraham S. Becker, economist, Council for Economic and Industry Research, Inc.; Abram Bergson, professor of economics, Harvard University; George M. Cobren, National Income Division, Office of Business Economics, Department of Commerce; Nicholas DeWitt, associate, Russian Research Center, Harvard University; Warren Eason, assistant professor of economics, Princeton University; Dimitri M. Gallik, economist, Council for Economic and Industry Research, Inc.; Milton Giffler, transportation economist, Department of Defense; Ernest S. Griffith, director of the Legislative Reference Service, Library of Congress; Gregory Grossman, department of economics, University of California; John P. Hardt, economist, Council for Economic and Industry Research, Inc.; L. M. Herman, Soviet area specialist, Bureau of Foreign Commerce, Department of Commerce; Holland Hunter, associate professor of economics, Haverford College; William A. Jaracz, Clearing House, National Science Foundation; Harold A. Kohnen, Legislative Reference Service, Library of Congress; Earl E. Miller, agricultural economics statistician, Agricultural Marketing Service, Department of Agriculture; Edmund Nash, international labor economist for the U. S. S. R., Bureau of Labor Statistics, Department of Labor; G. Warren Nutter, associate professor of economics, University of Virginia; Howard S. Piquet, senior specialist in international trade and economic geography, Legislative Reference Service, Library of Congress; Hilton E. Robison, agricultural statistician, Agriculture Division, Bureau of the Census; Michael K. Roof, senior social science analyst, Reference Department, Library of Congress; John Kerr Rose, senior specialist in natural resources and conservation, Legislative Reference Service, Library of Congress; Rose Marie Smith, statistician, United States Office of Education, Department of Health, Education, and Welfare; Timothy Sosnovy, consultant on Soviet housing and urban economy to the Library of Congress; Lazar Volin, special assistant, Foreign Agricultural Service, Department of Agriculture; Faith M. Williams, chief, Office of Labor Economics, Bureau of Labor Statistics, Department of Labor; Harold Wool, Department of Defense; Sergius Yakobson, senior specialist in Russian affairs, Legislative Reference Service, Library of Congress.

GROVER W. ENSLEY,
Executive Director, Joint Economic Committee.

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C. PROBLEMS OF SOVIET-UNITED STATES COMPARISONS

1. Conceptual difficulties

Most of the conceptual problems of comparing the Soviet and United States economies arise from the differences in structure and maturity of the two economies. For example, a greater variety and higher quality of goods generally are produced in the United States than in the U. S. S. R.; and these goods are produced in different proportions in each country, with the proportions themselves varying from year to year. As a result, aggregation of all the different commodities into an index of production which is suitable even for a

single purpose is difficult; and calculation of an index suitable for all, or probably even most purposes, is patently impossible. The problems of commodity composition of production and of value systems appropriate to use as weights are discussed in more detail in chapters II and VI.

There is a closely related conceptual problem of choosing representative and meaningful lists of commodities in making commodity-by-commodity comparisons of physical numbers of units produced in each country. That problem is discussed in chapter II, but it should be noted that a completely satisfactory solution is not possible owing to the above-mentioned differences in quality, variety, and importance of particular commodities in total production in the two countries. Further, rigorous adherence to comparability would have meant that few if any comparisons of physical units of output could be made. The compromise chosen was to compare a relatively large list of economically significant commodities for which data were available, after first having made every effort consistent with time and staff limitations to achieve comparability of coverage between the two countries. The coverage in most instances is believed to be sufficiently comparable for the present order-of-magnitude purposes, but, as noted below, information on coverage of the Soviet output, particularly, is often not readily available.

2. Statistical difficulties

For purposes of this study, United States data generally can be accepted with few reservations, although there are statistical deficiencies, some of which are discussed in the following chapter. The reliability of the Soviet data, on the other hand, has often been questioned. Because ultimate reliance of all Western studies on the Soviet economy, including this one, has been on statistics and information compiled and published in the Soviet Union—adequate data are unavailable from any other source—establishing the reliability of Soviet data is of crucial importance.

Soviet data has been criticized on a number of grounds, including the following: (1) Inadequate reporting and collating; (2) methodological and coverage noncomparabilities; and (3) outright falsification. Unquestionably, the distortion because of the first reason has been important, but still a considerable volume of data has been published, and Soviet statistics appear lately to have improved in this respect.

The methodological and coverage noncomparabilities have been even more serious. Regarding outright falsification in the sense of free invention or double bookkeeping, the majority of students of the Soviet economy have concluded that though Soviet statistics are often slanted, they are rarely falsified in toto.[3] Soviet statistics are often ambiguous as to both methodology and coverage, and sometimes intentionally misleading. In some instances (e. g., the value series on Soviet national income or gross production of Soviet industry), the methodological deficiencies have been very great, with the bias in a direction which shows the Russians in a favorable light. Improvements have been hampered by the Soviet attitude that statistics are an instrument which should serve the state; but, apparently because of past deficiencies have hindered Soviet officials and professionals, some improvements appear to have been instituted during the past few years.

The consensus of western experts is that Soviet data are usable if great care is taken. The reliability and accuracy of the statistics vary from series to series, but in general those data expressed in physical terms are apt to be better than those expressed in value terms. For that reason, this report relies almost exclusively on Soviet data expressed in physical terms.

The deficiencies and shortcomings of Soviet statistics discussed above were noted primarily in analysis of prewar Soviet data, and as noted, some improvements appear to have taken place, especially since about 1950. It is still too early to judge the reliability and quality of the large quantities of new statistics

[3] Bergson, Abram. Soviet National Income and Product in 1937 (New York: Columbia University Press), 1953, p. 7. See also pp. 6–9, especially footnote 10, for a detailed discussion of this point.

released in 1956 and 1957,[4] primarily because detailed information on their coverage and mode of compilation and calculation has not been published to date. If, however, the old Soviet policy of withholding most economic data is actually in the process of being abandoned, the questions of reliability and quality will be more easily and definitively answerable in the future. At that time it would be possible to interpret the new data more accurately, hopefully through the availability of more Soviet notes on coverage, but in any event through the checks on internal consistency which more detailed data would facilitate.

Before leaving the question of statistical deficiencies and reliability of data, a note of caution should be sounded on the interpretation to be accorded the single-figure estimates and all Soviet data. All the figures shown are believed to be accurate enough for present purposes, although they are not necessarily correct to the extent indicated by rounding. They were preferred to ranges simply because of the insoluble problems involved in determining meaningful limits without giving the reader an unwarranted impression of reliability. Because of uncertainties regarding methodology and coverage, all single Soviet figures should normally be interpreted as if there were an "about" preceding them.

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CHAPTER VII. SUMMARY AND CONCLUSIONS

A. INTRODUCTION

It has been over 2 years since the Joint Economic Committee sponsored a thorough review of the economic growth of the Soviet Union. During that time both new events and much more available data have made appropriate a fresh look.

This study has chosen two time periods for major consideration: 1928–55, taking as a starting point the beginning of comprehensive economic planning in the Soviet Union, and 1950–55, the postwar period after reconstruction in the U. S. S. R. was essentially complete.

The study has found comparisons difficult for several reasons. Outside events affecting both countries in the span of the study have made it hard to know what development trends might have been in the abstract. Territorial changes in the U. S. S. R. invalidate some of the apparent trends which seem to apply. Conceptual difficulties are inherent in trying to compare 2 countries whose economic structures are so different, where values in the 2 societies defy common translation, and where matters of definition plague most comparisons.

There have been statistical problems as well. Figures are not collected in the same way or kept for the same reasons. Different categories, the failure of statistics to measure qualitative differences, and gaps in information have added to the problems. There has been some falsification in Soviet statistics, but this study like all others has to be based fundamentally on Soviet records. They are, however, sufficiently internally consistent, and important enough to Soviet planning authorities that they can be taken as a useful starting point to analysis.

B. INDUSTRY AND TRANSPORTATION

Soviet industry today may be gaged as roughly one-third the size that of the United States, but its composition is quite different. The Soviet government has given first place to heavy industry and producers' goods to the neglect of

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[4] The most important of the new publications to date are:

Tsentral'noe statisticheskoe upravlenie pri Sovete Ministrov, SSSR, Narodnoe khoziaistvo SSSR, Statisticheskii sbornik, Gosstatizdat, Moskva, 1956 (National Economy of the U. S. S. R., a statistical handbook), 263 pp.

Tsentral'noe statisticheskoe upravlenie pri Sovete Ministrov SSSR, Kul'turnoe stroitel'stvo SSSR, Statisticheskii sbornik, Gosstatizdat, Moskva, 1956 (Cultural Construction of the U. S. S. R., a statistical handbook), 332 pp.

Tsentral'noe statisticheskoe upravlenie pri Sovete Ministrov SSSR, Sovetskaia Torgovlia, Statisticheskii sbornik, Gosstatizdat, Noskva, 1956 (Soviet Trade, a statistical handbook), 352 pp.

Tsentral'noe statisticheskoe upravlenie pri Sovete Ministrov SSSR, Promyshlennost' SSSR, Statisticheskii sbornik, Gosstatizdat, Moskva, 1957 (Industry of the U. S. S. R., a statistical handbook), 448 pp.

Statisticheskoe upravlenie RSFSR, Narodnoe khoziaistvo RSFSR, statisticheskii sbornik, Gosstatizdat, Moskva, 1957 (National Economy of the R. S. F. S. R., a statistical handbook), 372 pp.

consumer products, particularly of the durable type. It is a system under extreme pressure to grow and one where shortages constantly appear. Quality of output varies with the importance of the product in the eyes of Soviet authorities. They are capable of turning out advanced machines and good equipment; they are also prone to turn out shoddy goods for consumers.

Physical indexes, rather than value-based statistics, give the best indication of Soviet production trends to compare with those of the United States. A review of individual commodities shows that often the Soviet production quantities of 1928–55 are more akin to United States ranges of 1890–1920, and the Soviet period 1950–55 in many ways is easier to compare with the United States period 1922–27 than any more recent.

The Soviet Union has been able to borrow Western technology on a large scale, has shifted great amounts of manpower from agriculture, and has sacrificed most other goals to the single goal of growth of industrial and military power. Rates of growth have been influenced by the periods of collectivization and great purges, by war and territorial seizure, and by conquest and exploitation of the captive countries. In the same period of time the United States has had a long period of depression, a world war, and a phenomenal boom. Because of the artificial pressures for growth of industry and borrowed technology and experience, it seems probable that Soviet industry (as contrasted with other sectors of the Soviet economy) has grown faster than United States industry did at comparable stages of development, although periods can be found in United States industry with very high spurts of growth under special conditions.

United States and Soviet comparisons can be made in terms of absolute gaps as well as rates of growth. In many industries, the gaps have been widening as the United States forges ahead. But this of itself is not grounds for complacency, and would turn out to be a temporary phenomenon if the differential in percentage growth rates favorable to the Soviet Union were to be maintained long enough.

Soviet growth (where it has occurred) has been achieved by subordinating other goals, by a high rate of investment in industry, by the forced shift of labor out of agriculture, by borrowing technology, by accepting a smaller variety of goods, often of lower quality; and at the human costs of famine in some years, a system of forced labor and police repression, and low levels of living at all times.

For the future, many factors must be balanced and weighed in judging the outlook. On the one hand, continued high rates of investment should continue to yield more output. There is still much room for improving efficiency through better methods. Improved training of labor and the provision of some more incentives may raise productivity. Once the low decade is past, a new upsurge of numbers in the labor force should add to output of industry, too. But these gains must be weighed against the heavy needs to mechanize auxiliary processes if further gains in efficiency are to be made. More accessible ores and other resources are being exhausted, and the shift to new sources will take capital. The decline of labor inputs relative to capital may lead to smaller increases in capital efficiency. Resources may have to be diverted to building more housing, to improving agricultural output, and to replacing wornout and obsolete equipment. Instead of there being fresh capital windfalls from occupied territories, there may be a net drain of capital exports required to keep the captive countries and China within the bloc. Probably the net balance of all of these factors would make a rate of industrial growth possible that is higher than the likely United States rate, but not as high as the Soviet rate in many of the years since World War II.

Both countries have active programs for the peaceful use of atomic energy. The United States base of experience is more substantial, but Soviet research and programed power development warrant close attention.

Soviet transportation facilities are improving, but relatively they are neglected. A railroad system still relying principally on steam power, and still not uniformly equipped with four-axle cars, airbrakes, and automatic couplers provides about four-fifths of the service. Roads are very inadequate, and even waterways development is lagging, particularly as contrasted with publicity given schemes for improvement. Pipeline transport and transport aviation lag, too, although development of new jet and turbine-propeller aircraft may narrow the gap in the years ahead. Railways are in the early stages of dieselization and large-scale electrification of trunklines, as well as in improvements in signaling and roadbed. For the passenger, travel is like war conditions with tre-

mendous crowding, not to mention unspeakable conditions for prisoners in freight cars. Automobiles still are not a serious factor in Soviet transportation. Soviet transportation is retarded and could hold back general industrial progress. The new Khrushchev plan of May 1957 to regionalize some economic controls is designed in part to reduce dependence on inadequate transportation facilities.

C. AGRICULTURE

This is a retarded sector in Soviet development, partly because of natural limitations of soil and climate, and partly because Soviet authorities have not set a high priority on improvement, so long as enough food was raised to support industrial growth and feed military forces. Soviet authorities have viewed agriculture as a source of labor for industry, and at some points in time, of products for export which could pay for imported machinery. The desire to control the rural population and to control their output without having to pay more than a minimal amount for his product was a reason for the collectivization program which was so costly. In contrast to the United States, constant worry about raising enough food has been a feature of the Soviet scene. Over the course of the period under review, United States agricultural output has increased by 50 percent. Soviet output increases probably have been less, and even these have been aided by territorial acquisition. Meat and dairy product output actually may be lower today than in 1928.

The Soviet Union has about 30 percent more sown area than the United States, while in 1928, the position of the two countries was reversed. Productivity of the land is much lower than in the United States. The period of collectivization was accompanied by great livestock losses including draft power. Farm mechanization has largely been a matter of replacing animals, and even today equipment is in short supply as contrasted with the United States.

The output per worker of Soviet farmers averages only one-twelfth to one-sixth of their counterparts in the United States. They have farm-management problems; at the moment Soviet authorities see the need for greater rewards to farmers to encourage output for the general market, more decentralization of planning and reorganization of management of collectives.

Agricultural prospects are limited by the quality of the land and climate, but farms may be able to do somewhat better than in the period reviewed providing more machinery and fertilizer are made available. Now that needs to replace draft animals have been largely overcome, future capital investment in agriculture may pay bigger dividends in output. But the new areas put under cultivation may turn into a great dustbowl if a spell of dry years appears, shifting emphasis back to the more traditional areas.

Because of the Soviet capacity to allocate resources and to restrain consumption, expected continued lags in agriculture are more likely to limit consumer welfare than to hold back industrial growth in marked degree.

D. POPULATION AND MANPOWER

The Soviet Union's population is about one-fifth larger than that of the United States. The distribution by age and sex is unbalanced particularly as a result of World War II. Low birth rates were a characteristic of both the war and postwar periods.

Data on the labor force are incomplete, and there is no exact information on the number of persons held as slave labor. The labor force seems to be growing fairly slowly partly because of the effects of World War II, alluded to above, partly because with increased urbanization fewer women and children join the labor force, and partly because extended schooling is delaying entry. The most marked trend has been the shift from about 84 percent of the labor force in agriculture in 1926 to only 48 percent in 1955, as contrasted with the United States which had 21 percent in 1930 and 11 percent in 1955. But since 1950, to all intents and purposes, the Soviet shift was at an end. The combination of a much larger proportion of agricultural employment and the drive to raise industrial output, however, tend to force a larger share of the population into the labor force than is the case in the United States.

Educational levels in the Soviet Union for most of the population have been very low, with only 4 years of schooling commonly provided. Today, however, a major effort is changing the outlook markedly. Higher education as well as secondary education is under great pressure to expand, and in the fields of engineering and the physical sciences, enrollments exceed those of the United

States. A considerable program for training technicians is also underway. If current trends are continued, the Soviet Union will add each year a larger supply of well-trained people in the above-named fields than the United States is adding. The quality of Soviet training varies from very good to mediocre and limited in scope. Technicians are attracted to their endeavors because of the differentially higher pay and special privileges accorded this group in the Soviet Union.

E. LEVELS OF LIVING

It is apparent from the record of Soviet behavior that the goal of the system is not primarily to better the life of the consumer, but to enhance the power of the state. Consumers receive improved benefits only as the rulers believe more goods or shorter hours will increase productivity and keep unrest within manageable limits.

The Soviet level of living was little better in 1955 than it was in 1928. However, conditions were so bad in some intervening years that the progress from 1950 to 1955 was very considerable.

Soviet consumer expectations of better living may have increased in recent years, and failure of the economy to live up to these expectations may cause trouble, and indeed it seems to have done so recently.

Although it is extremely difficult to compare living levels, the real wages of Soviet workers appear at the very best to be only one-fourth to one-seventh as high on the average as those in the United States. Supplies of soft goods and foods are less inadequate than anything else. Consumer durable goods are being increased in output quite rapidly because they are starting from very low levels. At best the impact of these new so-called luxury items is very small on the level of living of the average Soviet citizen. Perhaps the most acute shortage is in urban housing, with the share of each person only 15 percent that applicable in the United States. And this does not measure the great qualitative differences which also exist.

It should not be overlooked that some Asiatic neighbors of the Soviet Union do not view Soviet levels of living as depressed, but rather as high. This means a comparision with the United States is not the only important one, even though our levels of living are not rivaled.

The trend in urban real wages in the two countries contrasts the problematical increase since 1928 in the U. S. S. R. with the 75 percent improvement in the United States. Since 1950, the United States has gained 14 percent more, in contrast to a probably larger gain in the Soviet Union, which started from a level low even by Soviet standards.

In the future, Soviet levels of living should continue to improve, although at nothing like the rate for 1950–55, but there is no readily foreseeable time when they will approach the levels of living of the United States.

F. NATIONAL INCOME AND PRODUCT

Very roughly, the Soviet national product can be said to be about one-third that of the United States. But this is a comparison which is particularly difficult to make because the structure and the value judgments of the two countries are so different. The absence of an adequate measure for translating ruble values into dollars adds to the difficulties of such comparisons. Data are too incomplete on the Soviet side to prepare a really comprehensive comparison.

Measuring the comparative structures in current prices only, without translation into a common currency, a larger relative share of United States resources seems to be devoted to consumption, and a larger relative share of Soviet resources to investment and to military activities. Illustrative of the difficulties of comparing the 2 economies is that any simple comparison of a share of resources devoted to military output when compared with the total output of the 2 economies in real terms is highly unrealistic. The size of Soviet military forces currently maintained in real terms is considerably larger than, perhaps even double, what might be indicated even by their larger relative share of their much smaller gross national product.

The sources of Soviet income by industrial origin have shifted over time. Measured in current price terms, the share of agriculture has shifted from 42 percent in 1928 to 28 percent in 1955. The shift in the United States has been from 9 percent to 6 percent in the same general years. Soviet industry has grown from a share of 28 percent to 40 percent, and United States industry from 34 percent to 40 percent. Most of the difference between the two countries is accounted for by the larger role of services in the United States.

It is not easy to measure precisely what the growth rates of national product have been in the two countries, and even when this has been done, unlike things are being compared. What limited evidence there is, shows a possibly higher Soviet growth rate over the whole period, but it is not demonstrably so. In the postwar period, the Soviet growth rate appears to have been definitely higher than that of the United States, but it has been declining. The absolute gap between the two countries is still widening, but the time may come when the differential in growth rates may also bring a narrowing of the gap.

The reasons for Soviet growth are not hard to find. They relate to the great effort to expand industry through new investment and through sacrifice of consumer living standards. They rest, too, in the earlier stage of development, and in the opportunities to borrow the experience and the technology of the West.

As for the future, the Soviet Union must reckon with trouble in the captive countries and ferment in the Soviet Union itself, with pressure on the most accessible natural resources, and with previous mistakes in planning. Even with these handicaps, whose total effect is beyond measurement, Soviet growth rates may continue enough higher than those of the United States that in time the gap between the levels of output in the two countries could begin to close. This is hardly to be expected in the near future. Therefore the Soviet hope probably is pinned upon their doctrinaire view that our economy will suffer either stagnation or collapse. We have no intention of affording them this opportunity, and their continuing disappointment in our economic prosperity is evident.

6. CONCLUSION

The economic growth of the Soviet Union has been at great cost to the Soviet people, and they have shared little benefit from the development of a great industrial plant. On the other hand, even the temporarily widening gap between the output of the United States and the Soviet Union leaves no room for complacency. Soviet economic capabilities are already great enough to support a formidable military machine and to engage in international activities inimical to the interests of the non-Communist world. It will be up to the United States to demonstrate the progress of which it is capable in partnership with other non-Communist nations if the Soviet power and influence is to be restrained.

APPENDIX A

A COMPARISON OF THE CONCLUSIONS WHICH WERE PRESENTED IN THE PREVIOUS REPORT ON THIS SUBJECT BY THE LEGISLATIVE REFERENCE SERVICE, AND THE CORRESPONDING FINDINGS OF THE PRESENT REPORT

I. *Old.*—The present economic capacity of Western Europe, the United States, and Canada is significantly greater in terms of absolute magnitudes, diversity, and flexibility than the combined strength of the Soviet bloc. This conclusion emerges from comparisons of statistics relating to such basic indexes of economic strength as manpower, agriculture, steel capacity, transportation, and power potentials.

New.—The present economic capacity of the United States is significantly greater in terms of absolute magnitudes, diversity, and flexibility than the strength of the Soviet Union. This conclusion emerges from comparisons of statistics relating to such basic indexes of economic strength as agriculture, steel capacity, transportation, and power production.

(The two conclusions differ only because the geographic areas encompassed are not the same. Neither comparison includes the potentials of the Communist bloc countries of the Far East, or of other free world countries.)

II. *Old.*—In the period 1938–53, as a whole, the national product of the United States increased about three times as rapidly as that of independent Europe, and almost twice as rapidly as that of the Soviet Union. To a substantial degree, this difference reflects the varying effects of World War II. Between 1948 and 1953 the national product of the United States grew not quite 30 percent faster than that of independent Europe, and only two-thirds as fast as that of the Soviet Union.

New.—In the period 1928–55, as a whole, the national product of the United States increased at approximately the same rate as that of the Soviet Union with any statistically apparent Soviet advantage lying well within the range of error for such crude calculations. Between 1950 and 1955 the national product

of the United States grew statistically only three-fifths as fast as that of the Soviet Union. To a substantial degree the parallel rates of the longer period reflect the varying effects of World War II on both countries, the depression of the 1930's in the United States, and the waste associated with collectivization and purges in the 1930's in the Soviet Union. Soviet growth generally in the past (when not at war) has been greater than that of the United States because of the strenuous efforts to spur investment in growth-inducing industries, with a willingness to accept great human costs and lopsided results. Also factors are the earlier stage of development, and the ability to borrow technology from the West.

(The two conclusions differ only because of the changes of time periods included, plus the difference in geographical coverage. Neither report takes into account growth in Communist bloc countries of the Far East, or other countries of the free world.)

III. *Old.*—An examination of the various factors of production (growth of labor input, agriculture, housing, etc.) in the United States and in the Soviet Union today gives strong grounds for expecting that the absolute gap in the size of the 2 economies will widen over the next 2 decades, although the rate of growth in the Soviet Union might be somewhat higher than the rate of growth in the United States.

New.—An examination of the various factors of production (growth of labor input, agriculture, housing, etc.) in the United States and in the Soviet Union today gives strong grounds for expecting that the absolute gap in the size of the 2 economies will widen over the next 2 decades, although the rate of growth in the Soviet Union might be somewhat higher than the rate of growth in the United States. But comparisons of overall growth have limited applicability and meaning when the structures of the two countries are so different. A review of individual sectors indicates that the Soviet industrial threat, particularly in areas closely related to military strength, is much more serious than any overall comparison indicates; in contrast, agriculture, many service activities, and consumer well-being in the Soviet Union are not improving in relation to the United States as fast as the average growth of the Soviet economy.

(The two conclusions are consistent, but the new report is more specific in analysis of the significance of the trends.)

IV. *Old.*—Economically, Western Europe has been growing somewhat more slowly since 1938 than has the Soviet Union(although its growth has been more rapid than that of the captive countries. If the rate of growth of Western Europe is not to fall even farther behind that of the Soviet Union it is necessary that certain "bottlenecks" be eliminated.

New.—Not within the scope of the new study.

(Western Europe, as a whole, however, has made good progress economically since the time of the previous study.)

V. *Old.*—A major reason for the slow economic progress of the captive countries of Eastern Europe has been the tremendous drain of their resources by the Soviet Union. As in the Soviet Union, the weakest sector has been agriculture.

New.—Not within the scope of the new study.

(Eastern Europe, however, since the time of the previous study, has experienced the revolt in Hungary, a shift of power in Poland, and other changes in the relations between the Soviet Union and the captive states in attempts to obviate further troubles.)

VI. *Old.*—Per capita personal consumption in the United States is more than 40 percent higher than it was before the war, while in independent Europe it has risen, on the average, by 11 percent. In contrast, per capita personal consumption in the Soviet Union and Poland is barely above the prewar level; in other captive countries, especially East Germany, it is still below that level. Thus, differences in living standards between the East and the West have widened over the past 15 years.

New.—Per capita personal consumption in the United States is half again as high as it was in 1928. In contrast, per capita consumption in the Soviet Union has been held so low by the emphasis on industrialization, by collectivization of agriculture, and by war, that it may be no higher today than it was in 1928; more precise comparison is not possible in the face of statistical limitations. In the period 1950 to 1955, United States personal consumption levels have continued to rise, although not as fast as in the Soviet case where the necessity to recover from the abyssmally low levels of the war and early postwar periods was acute. Overall, Soviet levels of living can be judged in United States terms to be about

one-seventh those of the United States, or in Soviet terms, about one-fourth those of the United States.

(Any differences in the two conclusions are occasioned by changes of time and geographical coverage.)

VII. *Old.*—Prior to the war Eastern Europe was more dependent, tradewise, upon Western Europe, than Western Europe was dependent upon it. Since the war, trade between these two regions has contracted greatly.

New.—Not within the scope of the new study.

(There has been some tendency, however, for trade between these two regions to revive.)

VIII. *Old.*—Careful consideration should be given, on the one hand, to the restraints on East-West trade that are important for direct military reasons and, on the other, to the desirability of cultivating friendship with the people in Communist countries via trade in nonstrategic goods. The line of demarcation between goods in each of these categories and other goods should be drawn as clearly as possible. At one extreme is the possibility of cutting off all trade between the free world and the Communist bloc. At the other, is the possibility of encouraging the importation of needed raw materials from Communist countries in exhange for consumer, as opposed to producer, goods.

New.—Not within the scope of the new study.

(In general, however, the trend has been in the direction of fewer restrictions on trade since the previous study was written.)

IX. *Old.*—The West has tremendous economic power whereas the Soviet bloc, through propaganda and unfulfillable promises, has been hiding its lesser economic strength. It is in the interest of the United States that these facts be made known throughout the world, particularly in underdeveloped areas.

New.—The United States has tremendous economic power, and though the Soviet Union is now the second greatest single economic power, it lags and will continue to lag for the indefinite future behind the United States. It is in the interest of the United States that the facts of continued United States economic growth be made known throughout the world, with an equally clear identification of the high costs and continuing difficulties associated with the Soviet growth. While confident of our abilities to hold our overall lead in total output, consumer well-being, and technological progress, we must recognize that these gains and leadership will be held only by continued attention to emerging conditions, by proper foresight in adjusting trends in production, resource availability, and trained manpower, and by the preservation of those institutions and attitudes which have created our advantage over other economic systems.

(The conclusions are consisent. The new report places more stress on the continuous exercise of all our abilities to safeguard our expected leadership. Our continued expected lead depends upon exercise of all our abilities to keep it so.)

X. *Old.*—The Communist bloc will continue intense efforts to increase its output, especially heavy industry, with little regard for human costs. In view of this fact, appreciation of the substantial successes of the United States and independent Europe, acting in close cooperation, in achieving both industrial expansion and better living is essential. Such cooperation, continued in the future, can serve as a basic weapon in the East-West struggle.

New.—The Soviet Union will continue intense efforts to increase its output, especially heavy industry, with less regard for human costs than is common to the West. In view of this fact, the United States must make full use of its resources within the framework of its free institutions to serve as an example to the rest of the world and to maintain its commanding lead in output in the full range of goods required for a strong and balanced economy.

(The conclusions are consistent, aside from the difference in the scope of the two studies. International cooperation in the free world is still important, although not studied in this new review. (See reports of the Subcommittee on Foreign Economic Policy.) The former Communist bloc policies of little regard for human costs have proved sufficiently disastrous since the previous report was prepared that some concessions in living conditions have been forced in both the captive countries and the Soviet Union itself.)

XI. *Old.*—It is important that the Western countries intensify their efforts in the field of education. The more immediate need is to train adequate numbers of scientists, engineers, and technicians. In the longer run, it is essential to keep raising the level of general education.

New.—It is important that the United States intensify its efforts in the field of education. The more immediate need is to train adequate numbers of scien-

tists, engineers, and technicians. In the longer run, it is essential to keep raising the level of general education.

(The two reports are consistent, aside from their coverage of this problem. Much more detailed information is available on this topic than was true at the time of the previous study, and if anything, the needs can be more forcefully and specifically stated today.)

XII. *Old.*—Superiority in economic strength and economic growth are desirable ends in themselves, but they do not assure political and military security. In fact, an economy that is already largely mobilized for war can operate with great effectiveness, and for some time, against a considerably stronger economy that is not so mobilized.

New.—Superiority in economic strength and economic growth are desirable ends in themselves, but they do not assure political and military security. In fact, inadequate attention to foreign affairs can allow disastrous political defeats for the strongest nation, paving the way to a most unfavorable military situation. Also, a smaller economy mobilized for war and equipped with the means to deliver attack with unconventional weapons in quantity can destroy a larger economy less well prepared, even though the attacker may have his home base destroyed as well. Plans for defense cannot be based on the presumption of time to mount a traditional mobilization of the economy after hostilities have begun. Defense must rest upon three major elements: (1) Forces in being to meet a range of eventualities to discourage the resort to war by aggressive forces; (2) a growing and flexible economy able to keep up with the technological race which tomorrow could upset the present balance of terror; (3) adequate attention to the political, moral, and economic forces which can turn away the need for war and preserve a growing prosperity for mankind.

(This conclusion goes beyond the detailed study contained in these pages to draw on other work conducted by the Subcommittee on Foreign Economic Policy during 1956. It is not inconsistent with the conclusion of the previous study, but reflects a shift in emphasis from any possible implication that a major war would follow the pattern of World Wars I and II which allowed the United States gradually to marshal its greater economic strength to turn the tide in warfare. Such strength is important, but now mostly for its ability to maintain the correct balance of active forces and to have freedom of choice in pursuing other economic and political policies in the world.)

Appendix B

A Cross Comparison of Selected Summary Data From the Previous Report and the Present Report

The previous study by the Legislative Reference Service carried summary tables contrasting the economies of the United States, Western Europe, the Soviet Union, and captive Europe. Because of changes in scope and treatment, and additional statistical information, not all categories of information in that report and this current effort can be cross compared. However, some linkage can be provided, and headings appearing in the pervious report are repeated here, showing both the previously reported information and the current figures which correspond, with brief explanations of any significant shifts.

Item and years	United States	U. S. S. R.
Population change:		
1938–52 (old)	20 percent	9 percent.
1926–55 (Soviet and 1930–55 United States (new).	34 percent	33 percent.
1950–55 (new)	9 percent	9 percent.
(The 2 sets of figures are not inconsistent, for the former comparison was of the World War II period, while the newer comparisons mask the effects of the war.)		
Population size:		
1953 (old)	161 million	212 million.
1955 (new)	165 million	198 million.
(This represents the significant change in estimate of the Soviet population in the light of information not available at the time of the earlier report.)		
Labor force size:		
1939 or 1940 (old)	56 million	95 million.
1953 (old)	67 million	108 million.
1926 Soviet and 1930 United States (new).	59 million	83 million.
1955 (new)	69 million	108 million.
Agricultural production:		
1940–52 (old)	50 percent	10 percent.
1925–55 (new)	49 percent	Not available.

Item and years	United States	U. S. S. R.
Arable land:		
1953 (old)	177 million hectares	225 million hectares.
1954 (new)	186 million hectares	220 million hectares.
Agricultural labor:		
1953 (old)	14 percent of total	50 percent of total.
1955 (new)	11 percent of total	48 percent of total.
Tractors in use:		
1953 (old)	4 million	0.4 million.
1955 (new)	4.8 million	0.8 million.
(This represents both further Soviet progress in pro luction and particularly the availability of better data.)		
Steel production:		
1949 (old)	71 million tons	Not available.
1953 (old)	102 million tons	38 million tons.
1955 (new)	106 million tons	45 million tons.
Coal production:		
1953 (old)	437 million tons (North America).	Not available.
1955 (new)	450 million tons	310 (392) million tons.
Petroleum production:		
1953 (old)	323 million tons	52 million tons.
1955 (new)	335 million tons	71 million tons.
Electricity generation:		
1953 (old)	513 billion kilowatt-hours	133 billion kilowatt-hours.
1955 (new)	625 billion kilowatt-hours	170 billion kilowatt-hours.
Rail freight volume:		
1953 (old)	605 billion ton-miles	538 billion ton-miles.
1955 (new)	613 billion ton-miles	647 billion ton-miles.
Motor-vehicle production:		
1953 (old)	7.3 million	0.5 million.
1955 (new)	9.1 million	0.4 million.
GNP growth:		
1938–53 (old)	120 percent (5 percent per annum).	62 percent (3 percent).
1948–53 (old)	27 percent (5 percent per annum).	43 percent (7 percent).
1928–55 per annum average (new)	3 percent (?)	4 percent (?).
1950–55 per annum average (new)	4 percent (?)	7 percent (?).
(The apparent differences in rates are not inconsistent. The previous report in its first comparison tends to reflect the differential effects of World War II, while the newer study takes a longer span of years for comparison. The text of the new study deliberately refrains from drawing up such a table of comparison for this period on grounds of possible noncomparability of data, although the figures shown here are hazarded in the text. In both countries, the more recent postwar comparison shows slightly lower rates.)		
National accounts:		
1952–3 (old):		
Agriculture	7 percent	23 percent.
Industry	41 percent	46 percent.
Services	52 percent	31 percent.
1955 (new):		
Agriculture	6 percent	29 percent.
Industry	43 percent	41 percent.
Services	51 percent	30 percent.
National accounts:		
1952–3 (old):		
Consumption	63 percent	47 percent.
Government	20 percent	27 percent.
Gross investment	14 percent	15 percent.
1955 (new):		
Consumption	69 percent	57 percent.
Government	13 percent	16 percent.
Gross investment	19 percent	27 percent.
(The differences in this case represent primarily changes of definition, rather than any significant shift in the economies concerned. Both sets of figures were developed in consultation with the same specialists. The more recent figures represent both an attempt to achieve greater comparability with the Bergson-Heymann and Hoeffding figures whose derivation is available in printed form, and also to refine to greater accuracy the distributions in the light of later statistical information.)		

(Acting Chairman O'Mahoney subsequently directed that the following material be inserted in the appendix of the record:)

ADDRESS BY MAJ. GEN. E. C. ITSCHNER, CHIEF OF ENGINEERS, UNITED STATES ARMY, BEFORE NATIONAL RIVERS AND HARBORS CONGRESS, MAY 16, 1958

Aristophanes, the ancient Greek dramatist, wrote more than 2,350 years ago that, "Wise men learn much from their enemies."

The Corps of Engineers, in prosecuting its military intelligence work, has been closely observing Russian water-resources development since the close of World War II. Soviet progress has been great in this short time, and we have learned much from it.

The primary lesson, of course, is that the Soviet regard a soundly planned and vigorously prosecuted water-resources program as an essential to the advancement of their productivity and their military power. Since it is obviously the Soviet strategy to challenge the free world both in military strength and in economic capability, it behooves us to examine closely their progress in both fields.

The Soviets have given water-resources development a priority second only to that of heavy industry designed to support military programs. This fact must be viewed in the light of Khrushchev's statement: "We declare war on the United States in peaceful production * * *. We will win over the United States."

In hydroelectric-power development, the Soviets already approach us in total installed capacity and have projects under construction that far exceed any of ours in capacity.

In inland waterway navigation, they have projects that rival ours, and plans that probably surpass ours, though the amount of navigation on their waterways is less than that on American waterways.

In irrigation, the types of development are considerably different, but the Soviet effort is roughly comparable to ours in scope. They have bigger projects than ours, and they probably are irrigating new acres at least as fast as we are.

In other aspects of water-resource development, such as flood control, water supply, and recreation, they do not have projects equal to ours, but appear not to need them at this time.

Their engineering, vessels, and construction, allowing for their different circumstances, appear to be equal to ours.

Their power equipment and engineering, in items like generators and transmission lines, are excellent, and they are superior to ours in a few characteristics.

The most remarkable fact about the Soviet water-resource effort is its rate of growth. At the end of World War II much of the European portion of the Soviet Union was devastated. Their major programs have been accomplished largely within 10 years—the bulk of them, in fact, within the past 5 years. The Soviets are basing the creation of new economic provinces, including new industrial and agricultural complexes, squarely upon multiple-purpose river-development plans. And they are using water-resource development as a means of dispersing industrial and other strategic installations throughout their vast domain—in area three times as big as the United States.

Most major Soviet rivers flow through generally flat terrain. Gradients are gentle and there are few gorgelike dam sites. Consequently, long, high dams are often required to provide the necessary heads. Large reservoirs are required to utilize the great seasonal variations in flow.

Soviet technology has proven itself to be completely adequate to meet technical problems in the water-resource field. In the earliest phases of the effort, before World War II, their progress depended on technological advice and equipment from Western nations. Today, however, large projects are planned, engineered, and equipped entirely from within the Soviet Union. They are staffed by workers receiving premium pay rates.

To illustrate the kind of work they are doing, I will mention a few representative Soviet water-development projects.

The Kuybyshev project on the Volga River has 2,100,000 kilowatts installed capacity, generated by 20 turbines, each of 105,000 kilowatts rated capacity. By comparison, the 18 turbines at America's largest power plant, Grand Coulee, have a rated capacity of 108,000 kilowatts each, for a total of 1,944,000 kilowatts. Actually the American generators have been operated for long periods of time considerably above their rating.

Kuybyshev Dam is composed of earth sections located between power plant and spillway, and between spillway and a bypass canal. These sections total 9,184 feet in length and have a maximum height of 164 feet. The concrete spillway at Kuybyshev is 3,280 feet long and is designed to pass a flow of 1,412,000 cubic feet per second. The bypass navigation canal at Kuybyshev Dam consists of 2 pairs of locks 100 by 1,000 feet which compares with the 110- by 1,200-foot size of the largest American barge locks. I cite these statistics to indicate that the Soviets are building works comparable to ours in all aspects.

Two super power dams, both well under way, are Krasnoyarsk Dam on the Yenisey River and Bratsk Dam on the Angara River. Krasnoyarsk Dam will have 4,004,000 kilowatts installed capacity—double the biggest American plant—and will include a vertical ship elevator which will lift vessels 370 feet upward

to a metal trough. Each of the generators at this dam will generate 286,000 kilowatts as compared to 108,000 kilowatts for the largest American generators.

The total known capacity of Soviet hydroelectric plants over 10,000 kilowatts capacity, complete or under construction, is over 26 million kilowatts. By comparison, the total United States hydro capacity at the end of 1957 was 27,675,000 kilowatts, with approximately 10 million kilowatts more under construction. Thus right now Soviet hydroelectric development appears to be roughly equal to ours in amount. However, their rate of increase is greater than ours.

The United States has no plants completed which reach the 2 million kilowatt mark, although John Day Dam on the Columbia River, on which construction will start this year, will ultimately have 2,282,700 kilowatts if sufficient upstream storage is developed to make this capacity economically justified. The new Niagara powerplant of the Power Authority of the State of New York will have 2,190,000 kilowatts installed. But the U. S. S. R. will have 10 plants ranging from 2 million to 6 million kilowatts, of which one is almost complete, 3 are under construction, and 6 are in planning or preparatory stages. One single plant, the Yenesey plant on the river of the same name, will have a capacity of about 6 million kilowatts, greater than the total capacity of all the powerplants at all the dams ever constructed by the Corps of Engineers, which now is 5,540,400 kilowatts. And the Corps has more hydro capacity installed than any other agency in this country.

A major feature of Soviet power development is the construction of a national transmission grid which will bring electricity, generated sometimes at remote hydro sites, to industrial centers of the U. S. S. R. The beginnings of this plan have already been accomplished in the recent completion of the two-circuit, 400-kilovolt, 3-phase alternating current transmission line over 500 miles long between the Kuybyshev powerplant and the Moscow industrial area. So far United States power operators have not built lines of this length and voltage. Our highest voltage lines carry 345 kilovolts.

One noteworthy Soviet line now under construction will bring Stalingrad power 300 miles to the Donbas industrial area over an 800-kilovolt direct current line. Building this equipment required Soviet engineers—with the help of some captured German apparatus—to solve unprecedented electromechanical problems.

About 70 percent of all Soviet power is used for industry. Most large plants are already on the growing national grid. More than half of Kuybyshev's power is being fed into the Moscow local network which serves the Soviet Union's greatest concentration of industry. The remainder is transmitted to Kuybyshev, Saratov, and the Urals to supplement the output of other powerplants in serving the oil, steel, and other industries. The new plant at Irkutsk, though only partly complete, is already serving a growing aluminum industry in central Siberia and is also providing power for electrified sections of the Trans-Siberian Railroad.

Russia's hydroelectric power achievements have been accomplished in a relatively short span of time, and her construction program appears not yet to have reached a peak. Fuel costs are high in the Soviet Union, as in the case of many of the underdeveloped countries of the world. Therefore, Soviet hydroelectric power progress is receiving great stress in propaganda aimed at influencing other countries.

Though Soviet inland waterway development is not as spectacular as power, it is nevertheless noteworthy. The Soviets have more than 3 times the 22,500 miles of inland waterway in the United States, but a mere comparison of mileage is not very significant. Many of their waterways are relatively undeveloped rivers and others are minor canals. They are, however, doing important work of modernizing the navigability of some of their principal rivers and lakes. Much of this has been incidental to multiple-purpose projects.

One of the better known Soviet projects is the Volga-Don Canal, connecting the Black and Caspian Seas. This permits them to build submarines in large, inland shipbuilding yards along the Volga. From the Volga, a canal extends 63 miles westward to the upper end of a 160-mile long reservoir on the Don. There are 13 locks, all modern and highly ornamented. The project also provides power and furnishes water for the irrigation of nearly 5 million acres of land.

On the Volga, a series of 12 dams, of which 8 are already complete or under construction, will provide a 10-foot or deeper channel over 2,000 miles of the main stream.

The Volga is connected with the Moscow area by a 75-mile canal, which has large locks, 100 by 1,000 feet and 18 feet deep over the sills. In other words, they are almost as big as the locks now under construction on the Ohio, but are deeper than our newest Ohio River locks, which have 15 feet of water over the sills.

A 300-mile canal, with small and antiquated locks, now connects the Volga system, near Moscow, via Lake Onega with the more modern Stalin Canal system which joins the Baltic and White Seas. The Soviets have undertaken a complete reconstruction job of the Moscow-Lake Onega link and by 1965 plan to have a waterway with capacity equal to the Stalin Canal and the Volga-Don.

When this link is finished, the Soviets will have an inland waterway system linking the Black, the Caspian, the Baltic and the Arctic, and capable of carrying smaller types of seagoing vessels, including submarines.

The Soviets are making progress on modernizing numerous other waterways, including certain ones in Siberia. They are only beginning to learn to use their waterways in the modern sense with which we are familiar, and their waterborne commerce has not caught up with ours. However, their present announced goal is an 80-percent increase in waterborne tonnage in the 5 years preceding 1960, with a proportionate increase in vessels. Ports have been created on all the principal waterways and attention is now being given the modernization of freight handling.

Soviet irrigation claims are more vague and less well substantiated than those for power or inland water transport. During the period 1951 to 1955, the area under irrigation in the U. S. S. R. appears to have increased by about 6 million acres, or 24.8 percent. This compares with an increase in the United States during the same period of about 5,500,000 acres, or 21.6 percent. Much of the United States increase consists of sprinkler or other methods in areas outside the 17 Western States.

However, we may expect the rate of increase in the U. S. S. R. to accelerate considerably, for it is their practice to bring the irrigation portions of multiple-purpose projects along more slowly than other functions, and consequently the land reclamation benefits of some of their big undertakings are probably only now beginning to appear.

Some Soviet irrigation developments far outstrip the biggest American projects, at least so far as claimed acreage is concerned. One will provide water for 3½ million acres; another, for 4½ million; another, for almost 5 million; another, for almost 5½ million, and 1 in the South Ukraine is expected to make possible the irrigation of 8½ million acres. The biggest American projects cover about a million acres. Of course acreage figures do not provide an accurate measure of the amount of water made available.

The Soviets stress supplemental irrigation—that is, projects which provide only sufficient water to prevent crop failures in years of subnormal rainfall, and for supplementary watering in normal years. Many such marginal subhumid areas are in the Caucasus Mountains and the southern part of European U. S. S. R. In truly arid parts of the country, chiefly in Soviet Central Asia, most of the effort has been devoted to extending and intensifying cultivation in previously developed irrigated areas.

Some Soviet irrigation projects have been delayed or deferred because specially developed construction equipment was needed elsewhere. Others have been abandoned or indefinitely postponed when it became apparent that not enough water would be available to serve the ambitious irrigation schemes. Though the navigational and reservoir features of the Volga-Don project were rushed to completion in 3 years ending in 1952, the main irrigational canals are not yet completed, and only a small part of the planned area is receiving water.

However, this appears to be due not so much to any undervaluation of the irrigation function, as to a desire to fit irrigation development into the general pattern of agricultural operations and development. Instead of providing large amounts of construction equipment on irrigation construction work, the Soviets have much of the work done by farm labor and machinery drawn from surrounding areas during off-peak employment periods.

Reviewing these evidences of Soviet water resource development, certain conclusions come to mind. It is apparent that the Soviets are relying fundamentally upon such development to build up their economic and strategic capabilities and that the buildup of their economic capability is aimed squarely at worldwide economic competition with us. However, this does not neecssarily mean that

to compete with them economically, we must duplicate their effort in every detail. We must consider our water resource development effort in terms of its part in our own overall economic strength and capability. Our economic and industrial system is in a different stage of development from theirs, it is growing along different lines and it doubtless has different needs. Our resource programs should be aimed at meeting our own needs.

(The Bureau of Reclamation submitted for inclusion in the record the following tabulations:)

UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION

Annual appropriations and allotments from reclamation and other funds, fiscal years 1903–1959

Fiscal year:		Fiscal year—Continued	
1903	$6,115,000	1933	$25,867,801
1904	16,890,000	1934	114,991,000
1905	4,750,000	1935	35,252,750
1906	12,015,161	1936	42,776,100
1907	2,209,000	1937	42,671,600
1907 [1]	[2] 41,979,161	1938	81,540,100
1907	34,313,233	1939	46,533,112
1908	7,918,471	1940	84,393,947
1909	9,791,400	1941	80,215,635
1910	9,368,000	1942	104,553,070
1911	27,366,790	1943	94,231,539
1912	6,459,391	1944	47,486,933
1913	6,271,000	1945	41,628,916
1914	14,759,574	1946	127,925,374
1915	6,746,634	1947	121,885,952
1916	13,530,000	1948	148,831,211
1917	8,902,557	1949	271,833,717
1918	8,558,423	1950	367,197,413
1919	9,850,437	1951	277,732,134
1920	7,860,074	1952	241,558,510
1921	9,135,177	1953	214,887,752
1922	20,612,871	1954	148,314,210
1923	15,370,530	1955	168,129,711
1924	14,134,867	1956	185,275,126
1925	11,890,809	1957	200,917,829
1926	13,263,110		
1927	7,511,320	Subtotal	3,658,316,950
1928	12,271,440	1958	204,788,223
1929	14,443,400	1959 [3]	269,100,000
1930	19,403,000		
1931	9,582,000	Total	4,132,210,173
1932	22,371,000		

[1] Allotments made prior to Fallon, Nev., conference on July 27, 1907, were canceled and summary allotments issued.
[2] Credit.
[3] Budget estimates sent to Congress.

Appropriations—Civil Functions—Corps of Engineers—1940–59

[Millions of dollars]

1940	279.4	1951	619.5
1941	214.9	1952	617.2
1942	201.3	1953	562.1
1943	256.1	1954	426.6
1944	77.3	1955	443.7
1945	103.0	1956	612.0
1946	252.9	1957	639.2
1947	321.2	1958	638.3
1948	425.8	1959	[1] 752.9
1949	622.0		
1950	640.5	Total	8,705.9

[1] Recommended.